

JPRS-TND-84-022

28 August 1984

# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION



FOREIGN BROADCAST INFORMATION SERVICE

#### NOTE

JPRS publications contain information primarily from foreign newspapers, periodicals and books, but also from news agency transmissions and broadcasts. Materials from foreign-language sources are translated; those from English-language sources are transcribed or reprinted, with the original phrasing and other characteristics retained.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by JPRS. Processing indicators such as [Text] or [Excerpt] in the first line of each item, or following the last line of a brief, indicate how the original information was processed. Where no processing indicator is given, the information was summarized or extracted.

Unfamiliar names rendered phonetically or transliterated are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear in the original but have been supplied as appropriate in context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by source.

The contents of this publication in no way represent the policies, views or attitudes of the U.S. Government.

#### PROCUREMENT OF PUBLICATIONS

JPRS publications may be ordered from the National Technical Information Service, Springfield, Virginia 22161. In ordering, it is recommended that the JPRS number, title, date and author, if applicable, of publication be cited.

Current JPRS publications are announced in Government Reports Announcements issued semi-monthly by the National Technical Information Service, and are listed in the Monthly Catalog of U.S. Government Publications issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Correspondence pertaining to matters other than procurement may be addressed to Joint Publications Research Service, 1000 North Glebe Road, Arlington, Virginia 22201.

28 August 1984

# WORLDWIDE REPORT

## NUCLEAR DEVELOPMENT AND PROLIFERATION

### CONTENTS

#### ASIA

##### PEOPLE'S REPUBLIC OF CHINA

Economic Advantages of Nuclear Power Plants Underscored (He Mingxing; NENG YUAN [JOURNAL OF ENERGY], No 2, 25 Apr 84).....	1
Nuclear Power Plants Development Vital to Technological Revolution (Zou Hu; RENMIN RIBAO, 17 May 84).....	3
Finland Studying PRC Offer To Process, Store Spent Nuclear Fuel (HELSINGIN SANOMAT, 20 Jul 84).....	5
PRC Observer Addresses Antinuclear Conference (XINHUA, 1 Aug 84).....	7

##### TAIWAN

CHINA POST on U. S. Nuclear Deal With Beijing (Editorial; CHINA POST, 18 Jul 84).....	9
--	---

#### CANADA

Nuclear Power Industry 'Surging' as U.S. Cuts Plants (Michael Lewis; THE SUN, 29 Jun 84).....	10
Court Stalls Ontario Hydro Transmission Line Construction (THE CITIZEN, 27 Jun 84).....	11
Consortium To Build Nuclear-Powered Civilian Submarine (Shaffin Shariff; THE SUN, 5 Jul 84).....	12
Briefs Romanian Control System Contract.....	13

## LATIN AMERICA

### INTER-AMERICAN AFFAIRS

Argentine Foreign Minister Visits Peruvian Nuclear Center (LA PRENSA, 11 Jul 84).....	14
Briefs	
Argentine Credit to Peru	16

### ARGENTINA

Nuclear Waste Disposal Sites (TELAM, 2 Jul 84).....	17
CNEA Behind in Payments (BUENOS AIRES HERALD, 23 Jul 84).....	18
CNEA Budget Cuts To Cause Delays in Nuclear Program (TELAM, 30, 31 Jul 84).....	19
Constantini Admits Delays CNEA Obtains Funds Additional Funds Allocated	
Daily Criticizes Nuclear Budget Cuts (Editorial; LA NACION, 11 Aug 84).....	21
Briefs	
CNEA Employees Strike	23
Borras Considers Nuclear Reactor	23

### BRAZIL

Government To Sign Nuclear Agreement With PRC (O GLOBO, 2 Aug 84).....	24
Report on Nuclear Cooperation Agreement With PRC (FOLHA DE SAO PAULO, 16 Aug 84).....	25
Presidential Candidate Neves Comments on Program (Tancredo Neves Interview; O ESTADO DE SAO PAULO, 5 Aug 84).....	26
Government States Position on Nuclear Arms (FOLHA DE SAO PAULO, 9 Aug 84).....	27
Briefs	
Accord With PRC	28
Uranium Negotiations With French	28



## PERU

Briefs	
Huarangal Scheduled Operative 1986	29

## NEAR EAST/SOUTH ASIA

## INDIA

AEC Chief Discusses Performance of N-Power Stations (PATRIOT, 4 Jul 84).....	30
Paper Interviews Nuclear Power Board Chairman (M. R. Srinivasan; THE HINDU, 4, 5, Jul 84).....	31
Nuclear Power: Engineers Lured by Gulf Countries (THE TIMES OF INDIA, 9 Jul 84).....	40
Major Policy Decision on Tarapur Said Taken (G. K. Reddy; THE HINDU, 18 Jul 84).....	42
Briefs	
Talcher Heavy Water Plant	44
New Atomic Reactor	44

## PAKISTAN

Efforts To Counter Propaganda Against Program in U.S. Noted (DAWN, 2 Aug 84).....	45
President Addresses Majlis-I-Shoora on Nuclear Energy (THE PAKISTAN TIMES, 13 Jul 84; DAWN, 15 Jul 84).....	47
11 July Speech	
Editorial on Zia Speech	
DAWN on Nuclear Position	
Scientist Khan To Appeal Dutch Conviction (DAWN, 30 Jul 84).....	51
Criticism of Nuclear Plans Rebutted (DAWN, 5 Aug 84).....	52

## SUB-SAHARAN AFRICA

## SOUTH AFRICA

Heavy Water Deal With Swiss Denied (DAILY DISPATCH, 27 Jul 84).....	53
--	----

## WEST EUROPE

### FINLAND

Minister: Finland Should Put Its Spent Fuel in Rocks (HELSINGIN SANOMAT, 28 Apr 84).....	54
Scientists Develop New Method for Processing Reactor Waste (HELSINGIN SANOMAT, 11 May 84).....	55

### FRANCE

Nuclear Power Plant Operations (AFP SCIENCES, 7 Jun 84).....	56
Nuclear Waste Storage Project Abandoned (AFP SCIENCES, 7 Jun 84).....	57
Auroux Report on New Radioactive Waste Storage Sites (J. Auroux; AFP SCIENCES, 21 Jun 84).....	59
Framatome Seeks Diversification (SEMAINE DE L'ENERGIE, 27 Jun 84).....	67
Briefs	
Marcoule Reactor Shut Down	69
Increase in Nuclear Power	69
Paluel PWR Reactor	70

ECONOMIC ADVANTAGES OF NUCLEAR POWER PLANTS UNDERSCORED

Beijing NENG YUAN /JOURNAL OF ENERGY/ in Chinese No 2, 25 Apr 84 p 32

/Article by He Mingxing /0149 3046 2450/: "The Economic Accounting of Nuclear Power Plants"

/Text/ I. The Future of Nuclear Energy

The nuclear energy is 2-3 million times greater than chemical energy, the fission energy of 1 kg of uranium is equivalent to the energy released by burning 2,500 tons of standard coal and the fusion energy of the same mass is three times the fission energy.

The second half of the 20th century is the first stage of the development and application of nuclear energy. As of August 1982, there were 273 nuclear power plants operating in 24 countries and regions, producing a total of 168.35 million kilowatts of electric power. There were 229 nuclear power plants under construction with a total generating capacity of 215.27 million kilowatts, and 111 nuclear plants were on order with a combined capacity of 108.41 million kilowatts. It is predicted that by the year 2000 approximately half the countries in the world will have nuclear power plants and nuclear power will account for 30-40 percent of the total power output in some major western industrial nations and the percentage will be even higher for France.

II. Developing China's Nuclear Power

China is a large country with rich reserves of energy resources. But with 1 billion people, our per capita energy resource of China is only average among the countries in the world. In particular, China's energy resources are not uniformly distributed, coals are concentrated in Shanxi, Nei Monggol, and Henan, water resources are concentrated in the southwest and on the mid- and upper course of the Huang He and oil resources are concentrated in the east and west. The population, industry and agriculture of China, on the other hand, are concentrated in the coastal areas in the southeast. This distribution has caused great difficulties in the transportation of energy in China. In view of this situation, China must build a number of nuclear power plants in the south, the east, and the northeast where the industry and agriculture are developed and where the population is concentrated in order to relieve the shortage of energy in these regions and to promote the continued production of industry and agriculture in these areas.

## 1. Nuclear Energy Policy

China's nuclear energy should follow the policy of "Combine electric power and heating, combine peace time and wartime, and let nuclear power take the lead. "

Based on the economic analysis of nuclear power, nuclear power plants built in eastern and southern China should be primarily for electric power and those built in the north and northeast should combine electric power with heating. In order to reduce the severe pollution caused by burning coal for heating in large northern cities, such as Beijing, Shengyang, Changchun, and Harbin, roughly 20-30 450,000 kW low-temperature nuclear heating plants should be built to replace the coal-burning heating plants.

Calculations show that low-temperature nuclear heating plants are about 30 percent cheaper than coal-burning heating plants. Theoretical calculations show that they should be about 50 percent cheaper. If 450,000 kW low-temperature nuclear heating plants were built 2 kms east, west, south and north of Beijing, they could supply heat to 2.40 million people in the winter and the supply area would be 24 million square meters. As compared to coal-burning heating stations supplying heat to an equal area, the nuclear plants would cost about 30 percent less.

## 2. Investment Costs of Nuclear Power Plants

It has been estimated that it would cost 7.3 billion yuan to build a twin-reactor 1,800 MW nuclear power plant with the entire outfit imported. Combined with the costs of 30 years' supply of nuclear fuel, the total investment would be 12 billion yuan.

The cost to build a 1,800 MW coal-burning power plant plus 30 years of coal--180 million tons--and long-distance transportation costs, the total investment would be 17.7 billion yuan.

As can be seen from the comparison above, a twin-reactor 1,800 MW nuclear power plant costs 5.7 billion yuan less than a 1,800 MW coal burning power plant.

Building a series of large nuclear power plants in southern China, eastern China, and northeastern China not only costs less than building coal-burning power plants, it can also alleviate the pressure on transportation in these regions and reduce the environmental pollution in the cities and in the countryside.

9698

CSO: 4013/164

NUCLEAR POWER PLANTS DEVELOPMENT VITAL TO TECHNOLOGICAL REVOLUTION

Beijing RENMIN RIBAO in Chinese 17 May 84 p 5

[Article by Zuo Hu [1563 3275]: "It Is Imperative for China To Develop Nuclear Power"]

[Text] Transformation of the existing energy structure is a cardinal problem the new technological revolution must solve. In the light of predictions by some professional institutions of the world, the following changes will surface in the global energy structure within the next 50 years: petroleum and natural gas, in their share of balance between supply and demand of energy, will drop from about two-thirds at the present time to less than 40 percent, as a result of the limitations by conditions of the natural resources; coal will rise up, but it is not likely to be in excess of one-third of the share, because of the limitations by conditions of the environmental protection; hydraulic power will continue to maintain its share of approximately 5 percent; solar energy and other renewable energy sources (biomass-energy, wind-generated energy, geothermal energy) will increase to 3-5 percent of the share; nuclear energy will grow from 2-3 percent today to over 20 percent of the share. The forecast has not placed an excessively high expectation on the contributions of solar energy and renewable energy. This is because it takes a longer period of time for the new energy technology to develop its competitiveness to a magnitude of replacing traditional energy technology on a large scale.

People base their estimate of nuclear energy massively replacing petroleum and natural gas on the following factors: 1--Nuclear power generation is already a mature technology. Practice has proved that nuclear power plants can compete with thermal power plants economically, and that the former has less effects on the environment than the latter. 2--The second-generation nuclear power plants, namely, the fast breeder power plants, are expected to be popularized around 2000. By using the fast breeder, the utilization value of the uranium resource will surpass that of existing exploitable coal resources. 3--The proportion of electric energy in commodity energies will continue to grow. 4--Coal, petroleum, and natural gas, apart from being used as fuel, are still raw materials of the various chemical and industrial products essential to food, clothing, and daily necessities, whereas the only usefulness of uranium beneficial to human society is its use as fuel for generating electricity.

The technology of using nuclear energy was born in the 1940s. The attempt to use it for generating electricity began in the mid-1950s, and it was used for popularization of industries in the 1960s. Nuclear power and the computer, the technology being developed in a same period of time, are organic components of the new technological revolution. Since the 1970s, nuclear power plants have become an important mainstay of the power industry in a number of countries, and the porportion of nuclear power plants in the total output of electric energy and primary energy has increased steadily.

China must develop nuclear power. Our country is rich in coal and hydraulic resources. It is second only to the Soviet Union and the United States in coal reserves, but it ranks first in the world's hydraulic resources. Nevertheless, there has existed an uneven distribution of energy and resources, with over 60 percent of the coal resources deposited in North China and more than 70 percent of the water resources dispersed in South-west China, being distributed mostly in industrially underdeveloped areas, whereas energy shortages exist in industrially well-developed areas, thereby creating a situation of transmitting electricity from the West to the East and transporting coal from the North to the South. This has brought about tremendous difficulties in power transmission and coal transportation and increased the pressure on communications. To alter this irrational distribution, it is necessary to build nuclear power plants in the areas experiencing energy shortages. The comprehensive costs of building nuclear power plants, as shown in all aspects of investigation and proof, are economical and reasonable. Today, in many countries of the world, the cost of electricity generated by nuclear power is lower than that generated by coal.

China has already possessed the basic conditions of developing nuclear power. Over the past 20 years, China has secured a proven reserve of the nuclear resource for use in a fairly large number of nuclear power plants; it has built up nuclear technological equipment of a considerable magnitude; and it has had a powerful nuclear technological force and the experience to use nuclear energy. We develop nuclear power, with our sight set not merely at the immediate present, but more importantly at the distant future, for this is a measure of strategic significance tha must be adopted to meet the challenges of a new technological revolution. Per capita, China is not rich in energy and natural resources. The development of nuclear energy to alter and rationalize the energy structure is an important event which concerns whether there will be a dependable energy supply in the next 50 years or so. China's building of nuclear power began late, and this requires that we try hard to catch up without letting opportunities slip by.

12315

CSO: 4013/177



PEOPLE'S REPUBLIC OF CHINA

FINLAND STUDYING PRC OFFER TO PROCESS, STORE SPENT NUCLEAR FUEL

Helsinki HELSINGIN SANOMAT in Finnish 20 Jul 84 p 22

[Unsigned article: "China Offers to Take Olkiluoto's Nuclear Wastes; Costs Considered Too High"]

[Text] Teollisuuden Voima (TVO) is investigating the possibility of the aftertreatment and final placement of spent nuclear fuel in China. However, at this stage at least, China is considered a rather unlikely alternative for both economic and political reasons.

According to TVO's deputy managing director Esko Haapala, the preliminary offer to store Olkiluoto's nuclear waste in China has come from West Germany, where a consortium formed by business firms under the name of Alfred Hempel and Nukem is negotiating the Chinese treatment of nuclear waste. China is at this moment the only country which deals commercially in the burial of nuclear waste.

TVO received the Chinese offer in the spring, but for the time being at least it has not led to any additional measures. According to Haapala, TVO considers the proposed price, 1,500 U.S. dollars or over 9,000 marks per kilogram of uranium handled, "an enormous sum, which is outside all possibilities."

In addition to the price, political difficulties are putting an effective damper on TVO's enthusiasm for China. Haapala predicts that "extraordinary political obstacles" to the placement of Finnish wastes in China might emerge. Certainly not the least of these is that it would be necessary to obtain permission from the supplier countries Canada and Australia.

But TVO will continue to have another China card up its sleeve, even if it is a very distant future possibility, in Haapala's opinion. At this moment the most likely alternative is still burial of the wastes in Finland's rocky base.

The company's intention is to select by the end of next year 5 to 10 candidates for the site of the wastes and to carry out precise drillings and investigations in these regions by the end of 1992. Researchers obtained a feel for these through the experimental drillings conducted in Luvia in the spring.

The final site will be locked up until the turn of the century, and the placement of wastes begins 20 years later.

### Cheaper Domestically

TVO estimated originally that 1,200 tons of nuclear waste would accumulate during Olkiluoto's 30 years of use. According to Haapala, however, the amount is rising to a certain degree, because the plant's usability is better than estimated and efficiency is rising right now by 8 percent.

Olkiluoto's total production is reckoned at 240 terawatt-hours of electricity, which may itself be an underestimate. TVO has anticipated that waste placement in Finland would cost roughly 1.4 pennies per kilowatt-hour.

Storage of the entire quantity of waste would thus cost about 3.36 billion marks. A sum this size is also being accumulated in the government for the nuclear waste fund planned as a solution to the problem of financing waste treatment.

The nuclear waste monies collected in the price of electricity would not even begin to be sufficient for the China alternative. Treatment of the waste problem at the Chinese prices presented to TVO would cost nearly 11 billion marks.

### China Wants Western Currency

The need for Western currency is considered the biggest reason for the offer made last winter by China to bury nuclear wastes in that country. According to information circulating in the West, the agreement concluded with the West Germans would guarantee China 6 billion dollars or over 36 billion marks for acceptance of 4,000 tons of waste by the end of the current century.

The Chinese are believed to bury the waste virtually untreated in sparsely populated regions of northwestern China.

12327

CSO: 5100/2584



PEOPLE'S REPUBLIC OF CHINA

PRC OBSERVER ADDRESSES ANTINUCLEAR CONFERENCE

OW012100 Beijing XINHUA in English 2044 GMT 1 Aug 84

[Text] Tokyo, August 1 (XINHUA)--The 1984 World Conference Against Atomic and Hydrogen Bombs opens here today with an appeal for a total ban on nuclear weapons.

Speaking at the conference, Kiichiro Onodera, member of the preparatory committee of the conference, said the nuclear arms race between the two super-powers which "goes against our strong aspiration of preventing nuclear war and a total ban on nuclear weapons," has intensified rather than stopped since last year.

As the United States began the deployment of cruise missiles and Pershing-2s in Western Europe last November while the Soviet Union speeded up the deployment of SS-20 medium-range missiles in Europe and Asia, a dangerous situation has arisen in the confrontation between the two nuclear military clubs.

He said that people, wherever they are, have become more aware of the danger of nuclear war and the anti-nuclear peace movement has thus been developing widely and profoundly.

He said people should be determined to carry out a large-scale movement to cooperate with various movements in the world in preventing nuclear war and protecting the existence of mankind.

He said the three-day conference will discuss the nuclear arms race, the danger of nuclear war and issues concerning the opposition of nuclear weapons, disarmament and the peace movement as well as atomic power development and nuclear proliferation.

A five-member Chinese delegation, led by Luo Guanzhong, director of the Association for International Understanding, attended the conference as observers.

In his speech, Luo Guanzhong said the Chinese people, who love and need peace, always regard the maintenance of world peace as a long-term objective of their effort while striving to build their country.

He said China was compelled to have some nuclear weapons. However, China declared long ago that it will never use nuclear weapons first and never use such weapons against non-nuclear countries and regions.

He said that if the two superpowers take the lead in stopping experimenting, producing and improving nuclear weapons and reach an agreement on a large-scale reduction of nuclear weapons, China will be willing to join other countries in the meeting to discuss further reduction of nuclear weapons.

Luo's speech was well received by most participants.

Representatives from 28 countries and regions made speeches at today's meeting. The majority of the speakers urged the two superpowers to stop the arms race and reduce or not produce nuclear weapons so as to make efforts for world peace. They also called on the people of the world to strengthen their solidarity and make efforts to maintain world peace.

The conference was attended by 470 representatives from 36 countries and regions including the United States and the Soviet Union.

CSO: 5100/4136

TAIWAN

CHINA POST ON U.S. NUCLEAR DEAL WITH BEIJING

OW232010 Taipei CHINA POST in English 18 Jul 84 p 4

[Editorial: "Nuke Deal With Peking Hits Snag"]

[Text] U.S. President Reagan promised to sell Peking nuclear technology. The latest news from Washington reveals the Reagan administration is postponing submitting the treaty to Congress while ways are being explored, ways to tighten guarantees that the Communists will not use the technology to enable other Communist nations to make nuclear weapons.

A Washington newspaper reports the Reagan administration is demanding greater assurances from Peking that it will guard against the spread of nuclear technology. It is believed Peking has aided Pakistan's nuclear program. Peking refuses to give new assurances, contending the American demand is an attempt to reopen the deal.

Members of the U.S. Congress are even more skeptical than the Reagan administration. We can tell the Congress and the American people the Communists are not to be trusted. They do not keep their word. It appears that the nuclear deal is off permanently.

CSO: 5100/4135

## NUCLEAR POWER INDUSTRY 'SURGING' AS U.S. CUTS PLANTS

Vancouver THE SUN in English 29 Jun 84 p B10

[Article by Michael Lewis]

[Text]

TORONTO — Undaunted by the fact that more than 100 nuclear reactors have been cancelled in the United States since 1974, Canada's nuclear power industry is surging.

In fact, Canadian utility officials now view parts of the United States as prime customers for power surpluses that would help pay off massive construction loans from their nuclear program.

Nuclear power is touted in Canada as an answer to acid rain problems caused by coal-burning power plants. And unlike the U.S., where federal regulations are partly blamed for the demise of nuclear power, government subsidies and aggressive promotion are credited for the growth of Canadian nuclear power.

The Canadian government essentially plans, builds and licenses nuclear plants, and then sets electric rates.

Ontario is at the core of Canada's nuclear industry. Nuclear plants provide one-third of the electricity generated by Ontario Hydro. By 1992, nuclear plants are expected to generate more than 60 per cent of Ontario's power.

U.S. nuclear plants provide only 13 per cent of the nation's electricity.

That share is expected to grow to 18 per cent in the early 1990s, according to the U.S. Department of Energy.

The anticipated abandonment of Consumers Power Co.'s Midland Nuclear Plant in Michigan could play a key role in Ontario's financial future.

"Ontario Hydro's major markets are expected to be New York and Michigan . . .," says a recent Hydro report on future energy exports. Hydro's goal is to "maximize net revenue from electricity exports to U.S.A."

"We make a buck and the Americans save a buck," explains Arthur Hill, vice-president for Ontario Hydro. "Our nuclear energy is a lot more dependable than overseas oil."

Consumers Power officials dispute that.

"It would be irresponsible for us . . . to rely completely on another utility to supply power because their first and foremost consideration is serving their customers," says spokesman Thomas Holliday.

The state of New York has saved \$438 million since 1978 by purchasing Canadian power, and considers it "quite reliable," says a spokesman for the state. New York has just doubled its transmission capacity for

Canadian electricity.

Ontario Hydro produces electricity from nuclear plants for less than two cents per kilowatt hour, about half the cost of power produced by U.S. nuclear plants.

Officials say the fact that the government usually builds four reactors at a time from a unique and standardized Canadian design accounts for much of the price difference. The government also gets cheaper interest rates on construction loans.

U.S. nuclear plants are built from several different designs.

The concentration of nuclear plants in Ontario is unique. Of the 23 reactors operating or under construction in Canada, 21 are in Ontario. More than half of its nuclear generating capacity is still being built and is expected to come into use in the next eight years.

U.S. officials are warning that U.S. customers could be forced into paying higher prices in the future if they become too dependent on Canadian power.

Ontario's electricity sales to the U.S. have increased from \$6 million in 1971 to \$160 million in 1983. Other provinces also are trying to sell electricity surpluses to the U.S.

## COURT STALLS ONTARIO HYDRO TRANSMISSION LINE CONSTRUCTION

Ottawa THE CITIZEN in English 27 Jun 84 p 16

[Text]

TORONTO (CP) — A court decision stalling proposed construction of Ontario Hydro transmission lines could cost the utility and its customers \$600 million, the provincial Liberals say.

But Hydro, while admitting the ruling will cost between \$100 million and \$120 million a year, says the project may be set back only a year or two.

The Ontario Supreme Court ruling Monday set back plans to build power lines to connect the Bruce nuclear station on Lake Huron to southern Ontario cities by 1988.

Hydro spokesman Ian Wilson said Tuesday \$80 million to \$120 million a year is the estimated cost to replace power that would have been transmitted under the plan. The cost would probably be reflected in slightly higher electricity rates charged to residential users.

Wilson said Hydro could appeal the court decision or hold public hearings again. If new hearings were held, he said, the utility could probably work out an acceptable proposal that would see construction completed by the end of the decade, only a year or two

behind schedule.

But in the legislature, Liberal Leader David Peterson said the court decision could delay construction of the transmission route up to five years.

Using the higher of Wilson's cost estimates, Peterson said it would cost the utility and its users \$600 million. He described the situation as another costly blunder that would push up rates of the average provincial residential user.

Both Energy Minister Philip Andrewes and Environment Minister Andy Brandt scoffed at Peterson's figures.

Wilson said that without the major new transmission lines in place as expected by 1988, the electricity generated by new nuclear reactors coming on stream at Bruce in the next year couldn't be handled by the current system.

Some reactors would have to be shut down and their lost power replaced by importing American coal to fire thermal plants in southern Ontario, he said.

The Bruce A and B generating stations will have a generating potential of 3,570 megawatts after the permanent closing Saturday of a heavy water plant. The cur-

rent transmission system from the power plant can carry 3,470 megawatts.

That means 100 megawatts will have to be trimmed from Bruce A output whenever all four units are operating, said Alan Holt, manager at the Bruce station.

He said the output restrictions would be maintained until a computerized breaker system capable of turning off power to up to 1.5 million Ontario residents is in place and tested. That will not happen until six to eight weeks after a strike by electrical workers is over, Holt added.

The court judgment arose out of a January hearing at which citizens' groups and municipalities in the path of the proposed transmission lines testified they hadn't been properly informed of the hearing and Hydro's proposals.

A coalition representing more than 6,000 property owners began the court action last fall, saying the lines would affect the value of their property and result in expropriation of their lands.

Original hearings into the transmission corridor took place in early 1982 and the panel decided on a transmission system almost two years ago.

## CONSORTIUM TO BUILD NUCLEAR-POWERED CIVILIAN SUBMARINE

Vancouver THE SUN in English 5 Jul 84 p B1

[Article by Shaffin Shariff]

[Text]

Two B.C. companies are leading the construction of the world's first nuclear-powered civilian submarine.

An international consortium led by Port Moody-based International Submarine Engineering Ltd and a subsidiary, Energy Conversion Systems, Inc., is putting together the \$75 million project.

A prototype of the submarine will be tested in 1989 — 15 years after the current presidents of the two companies came up with the idea.

If successful, the new submarine will transform underwater exploration for oil and repair work under the Arctic ice.

The submarine work station is intended for commercial and scientific explorations in the Arctic and northern Atlantic, not military use, ECS president Greg MacDonald said Wednesday. But the sub is unique, he added, not just to the private sector, but for the military as well.

It can accommodate 13 people for up to 30 days and can dive to 600 metres.

Earlier this year, the two B.C. companies and the Marseilles-based Comex SA, a French diving equipment company, formed International Submarine Transportation Systems Inc.

The new company will draw on the parent companies' expertise to produce and market the new submarine, called the Sea Shuttle-Saga N. ECS, for example, is responsible for

developing the nuclear power source that will drive the submersible.

ISE is a world pioneer in developing unmanned, remote-controlled submarines.

"(ISE president) Jim McFarlane and I have been talking about this for 10 years ... when we thought the Arctic was really going to hop," MacDonald said. But it wasn't until 1979 that they decided on a joint venture to pursue the concept.

In 1980, both approached Comex, which agreed to form a consortium with the B.C. companies.

Because the sub is nuclear powered, formal approval of the project will be sought from the Atomic Energy Control Board in August, MacDonald said.

The reactor, which is similar to the Canadian-developed Slowpoke research reactor used at some Canadian universities, will only need refuelling every seven to 10 years, according to figures released by ECS.

But the shuttle reactor will be different from the Slowpoke because it is not pressurized. In case of failure, it will automatically shut down with significant temperature changes.

ECS says it chose nuclear power because of the relatively low capital and operating costs of this power source over others.

MacDonald refused to say how much the subs will cost individually.

BRIEFS

ROMANIAN CONTROL SYSTEM CONTRACT--CAE Electronics Ltd., a unit of CAE Industries Ltd. of Toronto, says it has received a \$7-million contract to provide two direct computer control systems for a Candu nuclear power generating station being built in Romania. The two systems will be delivered to the Cernavoda 1 and 2 power station sites on the Danube River and are similar to those supplied by CAE for other Candu 600-megawatt power stations. [Text] [Toronto THE GLOBE AND MAIL in English 5 Jul 84 p B13]

CSO: 5120/2



ARGENTINE FOREIGN MINISTER VISITS PERUVIAN NUCLEAR CENTER

Lima LA PRENSA in Spanish 11 Jul 84 p 2

[Text] Yesterday, the Argentine foreign minister, Dante Caputo, visited the construction site of the Nuclear Energy Center that is being executed in Huarangal, about 35 kilometers northeast of Lima, and gave assurance that this plant will be in operation within the anticipated period, that is, by 31 June 1986.

The illustrious visitor remarked firmly: "We have undergone a slight interruption and we have had problems in the continuity, but this center will certainly be finished."

Accompanied by the head of the Peruvian Institute of Nuclear Energy (IPEN), Gen Juan Barrera Delgado, and the Argentine ambassador, Anselmo Marini, Caputo toured the various facilities and observed the progress that has been made.

He began his visit through the upper part of the center, the tank that has a capacity to hold 5,000 cubic meters of water, from which one has a panoramic view of the entire atomic plant.

Then he went to the radioisotope production centers, the products of which will be used in medicine, agriculture and industry. They will not only supply Peru, but will also provide for the Andean Group, if this is required.

He also visited the plant for the nuclear reactor which was donated by Argentina, and which has been installed in a cylindrically shaped building. This is perhaps the last time that it will be seen in its "virgin" state, because it will be covered by a heavy reinforced concrete wall.

Caputo said that he was greatly pleased after having seen the projects on which Peruvian and Argentine technicians are working jointly. He added: "This center is proof of what effective south-to-south cooperation can be, and of our people's ability to develop a technology of their own."

The Argentine foreign minister expressed the view that, "This (the nuclear center) is something that will truly allow for the development of Peru's



capacity for nuclear technology. It seems to me that this is an important, decisive step toward the development of an autonomous capacity for nuclear technology in our countries."

At this Nuclear Energy Center in Huarangal, Argentina is financing 70 percent of the projects, while Peru is contributing 30 percent as a counterpart. A total of \$73 million has already been invested, with \$13 million left for its completion and putting into operation.

2909

CSO: 5100/2120

BRIEFS

ARGENTINE CREDIT TO PERU--Yesterday, Argentina extended the effectiveness of the \$40 million in credit to Peru for the purchase of Argentine food, and decided to increase by \$13 million its financial assistance for the construction of the Huarangal Nuclear Center. These points are contained in the main agreements from the 6th meeting of the Special Peruvian-Argentine Coordinating Commission which ended its meeting yesterday with the signing of the final minutes by Foreign Ministers Sandro Mariategui (Peru) and Dante Caputo (Argentina). The document states that the maximum period for the use of the \$40 million allocated for food purchases will expire on 30 April 1985. Argentina also expressed its willingness to refinance 95 percent of the payments on bills for principal and interest transacted during the period between 12 May 1983 and 30 April 1984. Foreign Ministers Mariategui Chiappe and Caputo signed a joint declaration, in which they express their countries' firm determination to strive on behalf of integration, the easing of world tensions, respect for international treaties, etc. [Text] [Lima LA PRENSA in Spanish 11 Jul 84 p 1] 2909

CSO: 5100/2120

NUCLEAR WASTE DISPOSAL SITES

PY030200 Buenos Aires TELAM in Spanish 2312 GMT 2 Jul 84

[Excerpt] San Juan, 2 Jul (TELAM) -- The feasibility of building nuclear waste disposal sites in this province is being studied here in an important meeting with the participation of 26 experts from organizations that are linked to the generation of energy.

It has been officially reported that the meeting, which is taking place at the Anti-seismic Research Institute of the National University of San Juan, is the first attempt to exchange knowledge acquired throughout the country.

The meetings began this afternoon with talks on the national inventory of nuclear waste by Engineer Carlos Perucca, on the geology of the sites and deep drilling by Leonor Salinas and Jose Ivan Grassi, on an exhaustive study of geostatistics by Jorge Girardi, on geotechnics by Gustavo Tabia, and on seismology in the Gastre area by engineer Juan Carmona.

The meeting which will close on Wednesday is studying the possibility of building sites for nuclear waste in San Juan, where it will be stored until losing its radioactivity. Members from the management of Radiological Protection and Security of the National Atomic Energy Commission (CNEA); the Engineering Center of Chemical Plants of Santa Fe Province; the Ceramic Materials and Atomic Carbons Division of the Atomic Center of Bariloche; the Materials Department of the CENA's Development Department; the [National Council for Scientific and Technological Research; the INIFTA of Buenos Aires [expansion unknown]; the CIDEPIINT of La Plata [expansion unknown]; and the Applied Research Institute of Pilcaniyeu, Rio Negro Province, are participating in the meeting.

CSO: 5100/2123

CNEA BEHIND IN PAYMENTS

PY231854 Buenos Aires BUENOS AIRES HERALD in English 23 Jul 84 p 7

[Text] (NA) -- The National Atomic Energy Commission (CNEA) is \$a5.34 billion (thousand million) [pesos] in arrears and has some debts going as far back as last December, the commission announced. In a report provided to provincial party congressmen, the CNEA blamed its poor credit standing on the national treasury which, it said, up to last June 30 had only provided the commission with 4.12 percent of its allotted expenditures.

Deputies and senators representing provincial parties in the National Congress requested the information as part of their "plan of action" aimed at pressuring the government into giving the CNEA enough funds to continue with its nuclear energy programme.

Those participating in the plan of action are: Senators Elias Sapag and Jorge Solana (Neuquen Popular Movement), Carlos Gomez Centurion (San Juan Bloquista Party), Ricardo Leconte (Liberal-Corrientes), Gabriel Feris (Autonomist-Corrientes), and four deputies from Jujuy, San Juan, La Pampa, and Neuquen, including Maria Cristina Guzman of the Jujuy Popular Movement.

Though lacking influence in the Lower House, the provincial party congressmen are expected to join with Peronist senators in the Upper House during debates on the 1984 budget in order to pressure the government into allotting more funds to the CNEA.

CSO: 5100/2123

CNEA BUDGET CUTS TO CAUSE DELAYS IN NUCLEAR PROGRAM

Constantini Admits Delays

PY301847 Buenos Aires TELAM in Spanish 1327 GMT 30 Jul 84

[Excerpts] Buenos Aires, 30 Jul (TELAM)--Alberto Constantini, the National Commission for Atomic Energy [CNEA] chairman, has stated that the construction of nuclear plants, including Atucha II, will be delayed in view of a cut in the CNEA budget. He said that he believes the administration will mainly deal with the managing of the debt instead of the Argentine nuclear program. He added that the delay in the construction program of nuclear plants will affect investments in other areas of the nuclear program.

In a statement published today by LA NACION, Constantini said that the budget authorized by the government will allow the CNEA to carry out those activities planned for the radioisotope program, the training of technicians, the radiology protection program, the nuclear security program, and the research program, but not the construction program. Constantini announced that during this year the CNEA will grant support to the radioisotopes program and the modernization of its infrastructure, which is behind schedule by several years. This entails the use of radioisotopes and radiation sources in medicine, agriculture, industry, and nutrition.

CNEA Obtains Funds

PY311531 Buenos Aires TELAM in Spanish 1436 GMT 31 Jul 84

[Text] Buenos Aires, 31 Jul (TELAM)--Alberto Constantini, chairman of the National Commission for Atomic Energy (CNEA), today said that the work of this organization will continue and that next year a normal work schedule to carry out current projects will be adopted.

Constantini, after a meeting with President Raul Alfonsin and Economy Minister Bernardo Grinspun, said that during the meeting a decision was made to obtain for the CNEA the necessary funds to reduce its debt in such a way as to make it easier to handle. Constantini added that the funds will permit the continuation of the Atucha II project and other reasonable works so that the CNEA could normally resume its work next January.

### Additional Funds Allocated

PY010008 Buenos Aires TELAM in Spanish 1755 GMT 31 Jul 84

[Text] Buenos Aires, 31 Jul (TELAM) -- At the end of a meeting today with President Raul Alfonsin and Economy Minister Bernardo Grinspun, National Atomic Energy Commission (CNEA) President Alberto Constantini reported that the executive branch today ordered that funds be granted to the CNEA to ensure the continuation of work by its subordinate organizations in spite of the significant cutback in the nuclear budget.

During the meeting, which took place at Government House this morning, a decision was made to immediately allocate to the CNEA a sum equivalent to the amount it received in the past 6 months followed by monthly allotments equivalent to 4 percent of the budget until the end of the year.

These allotments, Constantini said, will allow the CNEA to pay the total amount of its debt or at least reduce it significantly so it can continue to function. "We have never received this kind of financing before," Constantini said, adding that the economy minister will personally administer the funds at the request of President Alfonsin.

He said that the uranium processing plant, the heavy water plant, and the Atucha II plants are behind schedule and that their construction will be very slow this year. He remarked that this will cause a significant loss of resources as a result of unproductive expenses, but he said this cannot be avoided at this time of year.

Constantini remarked that the CNEA will try to save the technological aspect of these plants by continuing with the work until a regular work schedule is adopted next year. He said that the funds that have already been approved by the CNEA, will not be enough for all of the plants, but the CNEA knows that it is necessary to make a sacrifice this year.

As regards the Atucha II plant, Constantini said that the work will soon be continued. However, he said, I am not as concerned about continuing the work at a normal pace as I am about preventing the work done so far from being ruined. I would like the staff to continue at a reasonable pace so they can resume work in January 1985.

Constantini also gave assurances that nuclear cooperation programs with other countries will not be affected.

CSO: 5100/2124

DAILY CRITICIZES NUCLEAR BUDGET CUTS

PY131806 Buenos Aires LA NACION in Spanish 11 Aug 84 p 8

[Editorial: "To Administer the Debt"]

[Text] The chairman of the National Commission for Atomic Energy (CNEA) recently stated that with the allocation budgeted by the government the only scheduled activities that can be carried out are those in the fields of radioisotopes, training technicians, radiologic protection and nuclear safety, and research and development. In addition, it will not be possible to implement the program for building the nuclear power plants, including Atucha, which will have already been delayed 3 years in December.

On the other hand, the postponement of the program to build the nuclear power plants will make the investments in other areas of the nuclear program lose effectiveness, because the "power plants must be operational in order to make use of the results of research projects." What is the use, the official asked, of training technicians if the latter do not have the chance to apply their knowledge, thus promoting the brain drain. This being one of the few fields where our country has managed to overcome a critical phase, ranking us among the few countries with advanced nuclear technology, there is no doubt that these words uttered by engineer Alberto Constantini must be taken into account.

One of the CNEA chairman's ideas deserves special attention: "I feel that currently the purpose of my administration is to manage the debt of the corporation, when it actually should be to guide Argentine nuclear development." No matter how tough these words are, they conform to a reality that should not lead to discouragement but to the rational acceptance of that reality.

These circumstances demand officials who are clever administrators of the debt and perhaps this is a special component of their mission. It is true that in this task there is no room for exhibitionism that will prompt applause, but carrying it out is one of the best evidences of patriotism that one can give at this time. In addition, this requires that austerity no longer be a word used in occasional speeches.

The streamlining of the state, so often announced, and the resulting concrete decrease in public spending are part of that noble and patriotic mission of the good "administrators" of the debt.

However, it is impossible to soundly administer this debt--we refer to the public administration as a whole--if a rational criteria which inculcates the will to serve rather than the will to help oneself is not strictly applied. The strict application of this principle and the elimination of useless expenditures and activities by the state would allow, certainly, the reallocation of funds to those institutes, which, like those that are members of the CNEA, are decisively engaged in the setting of the nation's future.

Argentina must not delay its nuclear development, because this would imply risks for its future. On the other hand, any policy that directly or indirectly stimulates the continuing brain drain in no way will favor an improvement of the current situation.

CSO: 5100/2131



## BRIEFS

CNEA EMPLOYEES STRIKE--Buenos Aires, 9 Aug (DYN)--The employees of the National Commission for Atomic Energy (CNEA) today began a 48-hour strike demanding better salaries. A large group stationed themselves on the Ricchieri Highway stopping vehicles in order to make their demands more noticeable. The measure was decided last night by the union leaders after meetings held yesterday with Labour and Social Security Under Secretary Francisco Mugnolo and Public Function Secretary Jorge Roulet had failed. The CNEA employees claim that they have not been paid July's salary or an 18-percent increase granted by the national government, and they are also demanding a larger salary increase because they have suffered a 37.2 percent loss in the purchasing power of their salaries. Among other demands, they are claiming that the cost of their food be paid, because they understand that they work more hours than the rest of the national public administration. In addition, approximately 1,500 employees of the Ezeiza Atomic Center decided to publicize their demands by stationing themselves on the Ricchieri Highway, which joins this capital with Ezeiza International Airport, and by stopping cars to explain their situation to the drivers. This produced traffic delays with the members of the national youth soccer team also being affected, because they were going to practice this morning in the neighborhood of the atomic plant. The strike will last until 2400 on 10 August if an agreement is not reached with the national authorities. [Text] [PY091820 Buenos Aires DYN in Spanish 1328 GMT 9 Aug 84]

BORRAS CONSIDERS NUCLEAR REACTOR--(NA-DYN)--Defence Minister Raul Borras said yesterday Argentina was analyzing a project to develop a compact nuclear reactor capable of powering submarines and other vessels. Borras told the budget committee of the Lower House of Congress, however, Argentina was not in a position at present to undertake such a project and only if it proved feasible and economical would funds be requested for it in future budgets. The minister said besides submarines--"which would not be provided with nuclear head missiles"--the compact nuclear reactor would also serve peaceful purposes such as generating electric power in distant areas of the country to which the building of power lines to carry conventional power would be too costly. Borras also told the committee, which was studying military expenditure in this year's budget, with its current armaments level plus provisions in the budget, Argentina was in a position to adopt dissuasive action against any hypothetical threat of invasion but was not in a position to invade other territories. On cutbacks in the military budget Borras said they would not stop any research or development project currently underway: "The projects might not be as active as one would like, but they will not be suspended," he added. [Text] [PY081747 Buenos Aires BUENOS AIRES HERALD in English 8 Aug 84 p 11]

CSO: 5100/2131

GOVERNMENT TO SIGN NUCLEAR AGREEMENT WITH PRC

PY031518 Rio de Janeiro O GLOBO in Portuguese 2 Aug 84 p 24

[Text] Brasilia -- The Brazilian Government will sign a nuclear agreement with the PRC during the visit of PRC Ministry of Foreign Affairs Wu Xueqian, who will be in Brasilia 11-15 August. The final agreement is being negotiated in Beijing by officials of Nuclebras [Brazilian Nuclear Corporation] and Abdenur, Itamaraty's main economic adviser.

During President Figueiredo's visit to China last May, the two countries signed a memorandum of understanding in the nuclear field establishing basic guidelines for cooperation and the peaceful use of nuclear energy.

The memorandum included an exchange of basic research on nuclear energy and the development of technology related to research, projects, construction, and operation of power plants and reactors, in addition to studies on prospecting and processing of uranium, fabrication of fuel elements, and research on nuclear safeguards and radioisotopes.

The initiative for an agreement came from the Brazilian Government. The Chinese, who have serious problems in distributing their energy resources, were interested. The Chinese already have nuclear cooperation agreements with the United States and the FRG, but the agreement with Brazil will be the first nuclear agreement with a developing country. Brazil, in addition to an agreement with the FRG, has signed agreements also with Argentina, Venezuela, Peru, and Iraq.

CS0: 5100/2125

BRAZIL

REPORT ON NUCLEAR COOPERATION AGREEMENT WITH PRC

PY162255 Sao Paulo FOLHA DE SAO PAULO in Portuguese 16 Aug 84 p 15

[Text] Brasilia -- Brazil and the PRC yesterday signed a nuclear cooperation agreement which was not published by request of the PRC authorities, because the text must be submitted first to the PRC National People's Congress. But according to official reports, the document anticipates the exchange of atomic technicians, the supply of Brazilian uranium for PRC nuclear plants, and the supply of Brazilian nuclear equipment for the PRC atomic program, which foresees the construction of nine nuclear plants within the next few years.

The signing of the nuclear agreement was held at Itamaraty after the meeting between Foreign Ministers Saraiva Guerreiro and Wu Xueqian, who discussed the possibility of expanding bilateral relations. According to Foreign Ministry spokesman Bernardo Pericas, two subjects prevailed during the talks. The first is the creation of a maritime line between the two countries. This maritime line will use large grain ships to take cereal and iron ore from Brazil, and to bring PRC oil for Brazilian Petroleum Corporation [Petrobras]. The second subject is the problem of the Brazilian foreign debt and the possibilities for renegotiation from government to government. The signing ceremony and the meeting with Saraiva Guerreiro marked the end of Wu Xueqian's visit to Brazil, in which he visited Sao Paulo, Rio de Janeiro, and Brasilia, and in which he held talks with President Figueriedo and ministers of the Brazilian economic area.

CSO: 5100/2133

PRESIDENTIAL CANDIDATE NEVES COMMENTS ON PROGRAM

PY082348 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Aug 84 pp 4, 5

[Interview with Democratic Mobilization Party, PMDB, presidential candidate Tancredo Neves by staff reporters Luciano Ornelas, Tadeu Alfonso, Jose Marcio Mendonca, and Magno Madureira]

[Excerpt] Neves: As for the nuclear program, it is important for Brazil to master the full fuel cycle. We cannot be a nation worthy of respect in the world if we are not on a par with the advances of nuclear energy. We should, if only through modest programs, stay abreast of scientific achievements and take all possible advantage of nuclear energy without being dependent on foreign technology, provided the resources are available.

O ESTADO: Do you consider it necessary to review the size and the objectives of that program?

Neves: The program should be made compatible with our resources.

O ESTADO: The national scientific community is critical of the fact that Brazil bought a package of nuclear technology but we don't know whether it will work.

Neves: Yes, it was a complete package. The important point is that Brazil cannot abandon its policy of mastering the atom in all its phases. We must maintain a team of scientists and technicians who are abreast of scientific developments in this area. If Brazil has resources, it should take advantage of nuclear energy as much as possible.

O ESTADO: The Brazilian Government has already been accused of developing studies for the manufacture of an atomic bomb, and doing it covertly. Those studies are said to be conducted in the Advanced Studies Institute of Sao Jose dos Campos.

Neves: I don't know anything about that.

CS0: 5100/2132

BRAZIL

GOVERNMENT STATES POSITION ON NUCLEAR ARMS

PY101931 Sao Paulo FOLHA DE SAO PAULO in Portuguese 9 Aug 84 p 16

[Text] Brasilia -- Diplomatic sources at Itamaraty stated yesterday afternoon that the Brazilian Government has decided to express to the 40 countries that are participating in the disarmament conference in Geneva its position in support of preventing a nuclear war, ending the arms race, and attaining nuclear disarmament. The conference is sponsored by the United Nations, and the Brazilian position will be conveyed by Foreign Minister Saraiva Guerreiro. According to Itamaraty, the Brazilian Government considers that "all necessary efforts must be made to stop the nuclear arms race and to attain nuclear disarmament. On this matter, the Brazilian Government regrets [repudia] the reports to the effect that the British Government is interested in deploying nuclear weapons in the Malvinas Islands."

CSO: 5100/2129

BRIEFS

ACCORD WITH PRC--Foreign Minister Saraiva Guerreiro and PRC Minister of Foreign Affairs Wu Xueqian today formalized an agreement for cooperation in the field of nuclear energy, and signed a document creating special consulates in Sao Paulo and in Shanghai. The formalization of the agreement, whose text was only initialed because it must first be approved by PRC authorities before it is finally signed, was the main act achieved by Wu Xueqian during his visit to Brazil, thus marking the 10th anniversary of the establishment of diplomatic relations between Brazil and the PRC. [Text] [PY152233 Brasilia Domestic Service in Portuguese 2200 GMT 15 Aug 84]

URANIUM NEGOTIATIONS WITH FRENCH--Nuclebras is currently negotiating with French corporations the funding necessary for the industrial utilization of uranium and phosphates of the Itataia deposit in Ceara State. The Public Relations Office of the Brazilian Mines and Energy Ministry today released a bulletin stating that Itataia is the largest uranium deposit in the country. Its estimated reserves are 142,000 tons. [Text] [Brasilia Domestic Service in Portuguese 2200 GMT 23 Jul 84 PY]

CSO: 5100/2122

## BRIEFS

HUARANGAL SCHEDULED OPERATIVE 1986--Lima, 5 Aug (AFP)--It was reported here today that the Huarangal nuclear plant, which is being built 20 km north of Lima with Argentine technical and financial aid, will begin providing services to industrial, agricultural, and pharmaceutical sectors in Peru as of July 1986. On making this announcement, General Juan Barreda Delgado, president of the National Nuclear Energy Institute, also said that the construction of the nuclear plant stopped 1 year ago because of financial commitments that Peru could not meet. Gen Barreda, who traveled to Buenos Aires today, expressed his gratitude for the cooperation received from Argentine Foreign Minister Dante Caputo, who during the last visit to Peru adopted significant measures for the resumption of the construction of the nuclear plant. After reporting that the construction is in an advanced stage and that a potential 10 [potencia 10] reactor can already be installed, General Barreda said that he is traveling to Buenos Aires to restructure the project with Argentine authorities. The Huarangal project is valued at \$80 million. Gen Barreda also said that Brazil has repeatedly offered cooperation in this area, and that Peruvian authorities are studying these proposals, which may be accepted in the near future. [Text] [PY061412 Paris AFP in Spanish 2013 GMT 5 Aug 84]

CSO: 5100/2126

## AEC CHIEF DISCUSSES PERFORMANCE OF N-POWER STATIONS

New Delhi PATRIOT in English 4 Jul 84 p 5

[Text]

**Bangalore, July 3 (PTI)**—India will enter the third phase of its nuclear power programme with the commissioning of the second fast breeder reactor at Kalpakkam near Madras towards this year end. Atomic Energy Commission chairman Dr Raja Ramanna said yesterday.

All the major components of the reactor at Madras had designed indigenously. Dr Ramanna said delivering a talk on the "Performance of Nuclear Power Stations in India" organised by the students' chapter of the Institute of Engineers.

Dr Ramanna said in a mixture of carbide fuel — plutonium carbide and uranium carbide — would be used for the first time in the world by India. This is the latest technology in this sphere.

He said the last stage in the breeder reactors was based on the thorium cycle producing more uranium-233 than they burn.

India had been able to achieve self-sufficiency in the area of nuclear fuel due to the advancement in material sciences, he said.

Dr Ramanna said nuclear power was definitely much cheaper than the power produced by coal

(thermal) plants. While the initial investment in establishing a nuclear power station was about 25 per cent higher mainly because of safety devices and other modern gadgetry, the cost involved in running nuclear power plant was much less than for coal plants.

Dr Ramanna said under the first phase of the country's nuclear programme experimental reactors for producing nuclear energy had been tested.

During the second phase the experimental reactors were further consolidated and the country demonstrated that usage of atomic power was safe and reliable, Dr Ramanna said.

In the third phase, he said, plutonium produced as a by-product from the thermal nuclear reactors would be used in fast breeder reactors to convert depleted uranium into more plutonium and also to convert thorium into uranium-233.

CSO: 5150/0032



## PAPER INTERVIEWS NUCLEAR POWER BOARD CHAIRMAN

Madras THE HINDU in English 4, 5 Jul 84

[Interview with Dr M.R. Srinivasan, chairman of the Nuclear Power Board, by G. Balachandran and K. Venugopal, in Madras: "Perspective on Nuclear Power in India"; date not given]

[4 Jul 84 p 8]

[Text] The Indian nuclear energy programme, which is over three decades old, is regarded as a preeminent one in the developing world and compares in specific respects, especially on the research side, with the advanced. The national programme is a comprehensive one, encompassing research activities, nuclear power, and a host of other applications, and while there have been substantive external contacts and bilateral cooperative or supply relationships, the clear thrust over the longer term has been towards self-reliance.

Impressive achievements have been scored over time. The experience gained in the nuclear power field in a country that has been deficit in terms of the total energy available is especially valuable.

Nevertheless, the performance on the nuclear power front has been affected by a number of interlinked problems and weaknesses. Some of these have an external origin and are connected with the discriminatory international non-proliferation environment. Others are internal in nature. In general, the performance has been distinctly slower than the original plan. Among the problems encountered have been the escalations in cost, the long gestation periods involved in commissioning plants, and behind-schedule and relatively high cost heavy water production.

In the perception of the leaders of the Department of Atomic Energy, the scientists and the technologists, the programme has been able basically to get on top of the problems and, in fact, the corner has been turned. They have their sights set on the ambitious target of 10,000 MW of nuclear power generating capacity by the year 2000. And on a number of qualitative prospects.

Some of the issues that need to be debated widely, by experts and lay people alike, are these. How does our nuclear power programme compare with the experience of the rest of the world? What are our capabilities in this area? How much investment is needed to implement this programme and to improve the momentum? How well has the safety side been taken care of? And what about the economics of our nuclear power, present and future? Does the nuclear energy programme attract the best S&T talent or is this becoming a problem? Why have new institutional arrangements become necessary and what exactly are the roles of the Nuclear Regulatory Board and the Nuclear Power Board? And so on.

To get an insight into some of these issues, G. Balachandran and K. Venugopal interviewed in depth for THE HINDU Dr M.R. Srinivasan, one of the leaders of the nuclear energy establishment and chairman of the recently set up Nuclear Power Board. We present here detailed excerpts from the interview conducted in Madras.

Some of the recent reporting on the relevance of atomic energy and nuclear power development has given a distorted and possibly very negative image. Why this bothers me is because I believe these are based on a lot of misinformation...and because it has come just at a point of time when we are trying to turn around from a stage of rather dormant activity in this field to one of growth. This kind of doubt that has been created in the minds of newspaper readers and readers of magazines, in my view it is also possible it could create doubts or concern in the minds of decision makers.

#### The Global Scene

It is true that there are indeed serious doubts about nuclear development in the United States. But if you look at the reasons for this it appears that they are rather specific to the U.S., France, for instance, has had a very successful programme. They have gone ahead in building a large number of reactors and are now producing almost 50 percent of their electricity from nuclear reactors. Still there are some people who say that France has also decided to slow down its nuclear development. It is partially true.

The reason why the French are not building nuclear reactors is because their economic growth does not demand further installation of nuclear reactors. It does not mean they are repudiating their faith in nuclear power...They now do not feel the need to build reactors at the same rate as they were building in the Seventies.

India is not the only country in the developing world that is developing nuclear power. In fact, in some respects the contribution of nuclear power in India as a percentage (of the total power generated) is no higher than the percentage of nuclear power in the developing countries. In the world as a whole today nuclear power accounts for about 10 percent. If you take the developing countries alone, it accounts for 1.7 percent whereas in India the share of

nuclear power is only about 2 to 2.5 percent... And for a country that started off with such an enormous lead, it is not very high.

What the building of Kalpakkam has demonstrated is that we have the technological capability. But now we must build up the industrial capability. We have built one reactor and commissioned it; what we have to do is to build a number of reactors and in a shorter time span. But this is basically a question of management. By management I mean the entire chain of opening up of new sites, getting equipment manufactured in a short time span, organising construction and installation activities.

If you take a look at the National Thermal Power Corporation, for example, this is precisely what they have demonstrated—that they can, with good management, cut down the gestation period. There is one difference. A majority of NTPC projects have used imported equipment. We have had no opportunity to import and we have also believed there is no need for us to import. It is also not feasible given the Nonproliferation Treaty considerations, the sensitiveness of the equipment, etc., involved.

We believe that if we have a commitment to a programme of reactors as distinct from a one-reactor-at-a-time commitment, then industry can mobilise to make components in a sequence. For example, we say we want to put up 12 reactors of 235 MW each. Now the key components in the past have taken five to six years to make but we are already finding in the case of Kakrapara (the site of the nation's fifth nuclear power plant) where we have placed orders for these key components that manufacturers who had done the previous similar components, are able to do in three years what it then took them six years.

#### Flow of Orders

Now if we are able to maintain a flow of orders so that those manufacturers do not have to demobilise after building up these highly skilled teams of technicians, for example, very high quality machinists and welders, then they can have a substantial shortening of the construction period.

We have placed orders hitherto up to Kakrapara. We have also got the sanction of the Government for the import of certain items, basically special raw materials for four more reactors. That is going to give us a lead in the manufacturing because in the past what happened was each time a project was sanctioned, at that point of time we started looking around for overseas suppliers for raw materials. That has to come, and even if Indian manufacturers are ready to get started, they cannot start until they get these special materials.

We propose to depend basically on already qualified suppliers for the key components. We already have a commitment from an Indian manufacturer for the supply of 24 main reactor coolant pumps required for six reactors—two for Kakrapara and the rest for the four more reactors that are to come.

## Design Standardisation

The next question is that of standardisation of designs. What we mean by standardization is that the key components and the system will remain unchanged, although some features such as switchyard designing may remain site-specific. We have been finding hitherto, although we may have slipped on the civil construction, the controlling activity has been the manufacture of key components. So if we have the key components ordered out quickly enough, then we can bring down the construction schedules. What we would like to do is to reduce the construction schedule to eight years.

## The 10,000 MW Plan

The plan is to have 12 reactors of 235 MW, and 10 to 12 reactors of 500 MW by the year 2000. Based on 1983 costs, this programme would involve a total investment of Rs 14,000 crores. Of this, investment in the reactors would be a little less than Rs 10,000 crores and the balance would be for the heavy-water plants, fuel upgrading plants and other fuel cycle activities. The approximate investment per KW for the reactors would be Rs 11,700 at 1983 prices.

On the question of standardisation, I would like to clarify that today we do not yet have the design of the 500 MW reactor. There is a certain amount of component development work that has to be done, for example, fuel development.

We have set up a dedicated design group for the purpose and our intention is to freeze the design to the extent that manufacture of the key components can be taken up in 1985. The intention is to start the site activities by 1987.

When people talk about our programme for 10 to 12,500 MW reactors by the turn of the century, they probably feel we are aiming for too much. There is the belief that initially we should have a prototype. Only after we prove the prototype should we start building a number of them.

Now we don't think it is necessary for us to go that way because we understand the heavy water reactor system adequately. The scale-up that is involved in going to the 500 MW reactors is only the scale up in the physical size of a certain number of key components, namely the calandria, the end shield and the steam generators, and the main reactor coolant pumps. The first three are static components and we don't foresee much of a problem in scaling up those components.

## Expansion at Current Sites

It is very much on our minds because there is no doubt we have to spend as much as two years to open up a new site and create the infrastructure. Sometimes it takes longer, if we encounter special problems in land acquisition. So we certainly feel we should expand at current sites. Of course, the case of Kalpakkam is somewhat special because with the Reactor Research Centre located here, the activity has become large. So whether immediate expansion is feasible or not is difficult to say. But expansion is more feasible at Rajasthan, Narora and Kakrapar.

Sites for new plants will be capable of four reactors. But we may do like what the NTPC has done: we start work on two reactors and well before the first reactor has progressed a great deal, within two years of the commencement, we could take a decision to expand the site for four reactors. The idea is to have four reactor complexes.

#### Economies

Does a larger scale afford economies in the Indian context? It is really a two edged situation. If you were in the year 2000 discussing a programme that continued to build 235 MW reactors when the rest of the world is on to 1300 MW reactors, you could legitimately say we have saddled ourselves with an old fashioned design in terms of size. Already a number of 500 MW coal-fired sets are being built. By today's world standards, the 500 MW reactor is not considered large, indeed it is classified as a small reactor.

Why we think it necessary to have a 500 MW reactor is operationally speaking, you have the same number of skilled manpower with twice the generating capacity available, and this is quite important. Secondly, we also do want to reach a much higher rate of installation. If it takes eight years to put up a 235 MW reactor and eight years to up a 500 MW reactor and if the addition to the power capacity is urgent, as it is in India, the case for wanting a larger sized reactor is really very strong.

One can say, in a sense, we have lost time on this. If the commissioning of Kalpakkam had not been delayed due to various reasons well known by now and if we had not got locked up with resolving some difficult questions on the Rajasthan reactor programme, for instance, we might have done more on the 500 MW reactors by now. What we would like to do is to catch up on lost time. The gestation period for the first 500 MW reactor will be a little longer because there is a component development lead time. We think the first may take 10 years, whereas the 235 MW we are planning will take eight years.

#### Heavy Water

We are already putting up two plants, one at Thal (110 tonnes) based on the ammonia hydrogen exchange process. This will be associated with the Thal fertilizer plant. Another large plant is being set up in Andhra Pradesh, in Manuguru (185 tonnes) which will use the hydrogen sulphide water exchange process. Two more plants are on the anvil: one similar to the Thal plant at Hazira along with a fertilizer plant and another similar to the Manuguru plant at a new site.

We don't see why we cannot put up additional plants later. The real point is we have gone through a very difficult learning process in this technology, no doubt about that. But now fortunately we are at a point where we can confidently expect these plants to be put up and made to work.

The reasons why Baroda and Tuticorin had problems are well known and well understood. Even the Canadians had a very harrowing time in learning how to make large quantities of heavy water and in fact they rebuilt one of their



plants three times over and eventually when they put up these large plants they started producing so much heavy water that right now they have shut down one plant and another plant they had planned to start up has not been started because the rate of installation of reactors did not go up the way they expected and also the big export market they thought they would have has not materialised for various reasons.

The point at issue is others also have gone through difficulties and after the difficulties have been overcome, one is able to get the plants going.

Question: How do you say at this point in time that you have turned the corner?

You see Tuticorin has had good, steady long runs...

Q: Till December last year it was full of ups and downs, more of downs than ups...?

Well, you have to analyse the interruptions, what it is due to. For instance, if there is a problem associated with the ammonia plant you must count that out though I'm not suggesting that we are not dislocated...we are dislocated. But we know the reason. How we say we have learnt the problems is that in the case of Thal, we are going to be utilising two large ammonia plants for supporting one heavy water plant. We are providing for diversity there which we have not been able to do in Tuticorin.

#### High Pressure Process

In the case of Baroda a unique problem is that it is a very high pressure process that has given us a lot of problems with equipment, the valves, the pumps all give trouble. But this high pressure process is not being used in the other plants, you see.

The Talcher plant had the problem that it was linked to a coal-based fertilizer technology which everyone considers is not an easy thing to do. Therefore, we are not putting up fertilizer associated plants other than the gas-based fertilizer plants.

Manuguru and those to follow will not be tied to fertilizer plants. They are independent plants that will use the hydrogen sulphide process. Hazira will be ammonia based; the reason is ammonia based heavy water plants have lower capital cost per unit quantity of heavy water. So therefore one would not like to lose the opportunity of utilising a lower investment possibility.

[Text]

**Q** : With new heavy water plants being built to provide an estimated 15,000 tonnes of heavy water by the end of this century to sustain the projected 10,000 MW programme, would there be an excess installed capacity in heavy water beyond the year 2000?

Some people have thought that 10,000 MW of nuclear power is going to be the end. Now the 10,000 MW comes about today for two reasons. First, the currently known reserves of uranium that we have found in the country can support this programme over its lifetime. Second, this is also a good enough base to be able to start a fast reactor programme; the plutonium generation from this capacity would be such as to allow a reasonable rate of growth of the fast reactors which are required in the future both to utilise the energy content of the U-238 and eventually to enable us to go in for thorium utilisation by the U-233 route.

But we also think that over a period of time more uranium will be found in the country. Further, in the long term the type of reactors that we may build for U-233 thorium could be reactors that use heavy water as a moderator because whereas in the case of plutonium it is a very good fuel for fast reactors and it will breed only in fast reactors, in the case of U-233, it appears that it can breed equally well either in fast reactors or thermal reactors and if thermal reactors are built, the heavy water reactor appears to be good for that application. There will not in fact be a kind of curtain drawn and a large amount of heavy water left.

#### The cost of heavy water

In our profile for the 15 years (1985-2000), we have allowed for heavy water at Rs. 5,000 a kg at 1983 prices. Allowing for inventory and make-up, we find that nuclear power costs are lower than coal fired power costs.

**Q**: The current costs are higher, aren't they?

You have to allow for a low capacity factor because the investment is to be written off or is to be supported by a smaller throughput. So that problem is there, but the Rs. 5,000 projection is based on a reasonable operating factor, which is probably close to 70 per cent.

At 1983 prices, we find nuclear power costs are cheaper than coal based power costs in most parts of the country — excluding, of course, those areas at the mine mouths or very close to the coal belt. But I think people involved in the power planning business are now not so concerned about the relative economics at all, but are really concerned about the

ability to make coal available for power generation in the country. This is a very important point. Whether it be the expansion at the Tuticorin thermal plant or the new Mettur thermal plant or expansion at Raichur, people are worried about the physical availability of coal.

Secondly, coal costs are increasing at 15 per cent per annum compounded in the last 15 years whereas general inflation is about nine per cent per annum, and all indications are this trend of a higher increase in coal prices will manifest itself in future also because coal costs are strongly related to labour costs and secondly people are seeking better quality coal.

I have held the view, and to go back to Dr. Bhabha, we need not waste too much of our time on economics, cost comparisons. In fact, it was Nehru, who, when we started the first project, said "Look, costs apart, we need to develop this new source of power" and that argument is still valid. Nevertheless, I would like to disabuse one feeling that nuclear power development is not cost-economic.

#### Pricing nuclear power

Nobody would want to charge electricity consumers more than necessary. But the input cost of all energy production devices has gone up. For instance, the power from the NTPC thermal station at Ramagundam will not be less than 45 paise a unit. We'll be cheaper than that. One has to see that the electricity generation industry is kept in reasonable health. There is a feeling that many forms of energy in India are underpriced. The fact a electricity is underpriced, coal is underpriced, the cost of coal here is much lower than elsewhere in the world. This is for historic reasons and nobody is suggesting that overnight we change things. But to some extent over a period of time, some change has to be brought about slowly so that we start charging prices closer to cost.

One can define subsidies for a selected range of consumers, but then it is better to quantify such subsidies, otherwise one tends to have a rather confused state of affairs and we don't know where the money is going. One of the advantages of pricing energy closer to its economic cost is that the consumer is forced to utilise it in a more effective way. Although talk of conservation in India may seem meaningless because of the shortage we have, we do find that in industry, electricity use is going up faster than the rise of our GNP.

#### The increased cost of Tarapur fuel

For creating one unit of GNP, we spend more than one incremental unit of energy.

This shows the choice of technology in many of our manufacturing processes does not favour energy saving technology and this is what our industry must try to do. In Europe, Japan and so on, we find that energy use in industry has actually gone down.

It is true the French price (for Tarapur's fuel) is slightly more than the most recently published American price, by about 7-8 per cent. The reason for that is the U.S. has long-term contracts for the uranium ore concentrates entered into a long time ago. So they were buying it at a lower price. The uranium market has been swinging wildly...

The French have been buying their uranium from some African countries, and the enriched uranium they are supplying to us is based on the natural uranium from the two countries, Niger and Gabon. So the price to us reflects the price they are paying to these two countries for the natural uranium.

**Q.** Why has Tarapur's fuel bill gone up so sharply? Till 1982-83 the operational expenditure at Tarapur was around Rs. 22-23 crores a year. This year it has gone up to Rs. 107 crores.

One is we bought fuel for a two-year period because our pipeline had run dry. Secondly, it includes also the customs duty which has been jacked up disproportionately high. The price per kg. has gone up only marginally.

#### **The Soviet reactor offer**

The Russians sent a team to India in May and we had discussions on the various aspects of the proposition. No conclusion has been reached yet. This is to be followed up. At this moment, all we can say is that the reactors are technically good — reactors of that particular kind have been supplied to Finland and a number of other countries and they are doing well. They also have a 1000 MW size but that was considered too large in our context. Whatever decision is taken on the Soviet reactors, this is not going to be in lieu of our own national development.

It is simply a supplementary proposition because the country needs power in a hurry. As we know the economies in many parts of our country are floundering for want of power. So the proposition is that we should get these reactors on acceptable terms, political terms, as well as assurances on supply of fuel. Because we have to be careful that we don't get into a situation like that of Tarapur. Today it is difficult to say what the outcome will be.

We don't need to import reactors, that is not our primary programme. Our primary programme is to build reactors on our own. This is very clear. If as a supplement

we are to consider this programme that would be the justification. But then one will have to be satisfied with the terms and conditions that we will accept.

#### **Funding by States**

**Q.** Can nuclear power plants be funded by State Governments?

It is an interesting question. I'm not so sure that now the State Governments are in that position. If they are, I think, we would like to consider it. However, experience in the West about the diversity of ownership has not been a good feature. If we were to compare the U.S. and the French programmes, one can say that the success of the French is simply because the ownership of the nuclear power programme was entirely with one body and that was one reason why standardisation of designs could be brought about.

We'd like to consider this if we come across such a proposal.

#### **Safety issues**

Even prior to the setting up of the Nuclear Regulatory Board, the safety activities at our installations were kept independent of the operational responsibilities of the power stations. Now in Tarapur, Rajasthan and Kalpakkam we have had the Health and Safety Group which though physically at the plant site really reports to a separate authority, the Director of Health and Safety at the Atomic Energy Research Centre, Trombay. And there was an independent committee called the DAE Safety Review Committee. When we had to make certain modifications that had safety implications we could not make them till we got the procedures cleared by the Safety Review Committee.

#### **Nuclear regulatory board**

But with the size of the programme increasing, it has been found that the time has come when we should constitute the Nuclear Regulatory Board with a much greater measure of independence than it has been the case in the past. The Chairman of the Nuclear Regulatory Board will submit his report to the Atomic Energy Commission which is not the operating body for the reactors.

The Nuclear Power Board is responsible for the design, construction, commissioning and operation of the facilities. We will continue to have health and safety groups independent of the operating establishment in each plant and we will continue to have the DAE Safety Review Committee which has the expertise to analyse plant designs and plant operating procedures and unusual occurrences. The Safety Review Committee will put up its report to the Nuclear Regulatory Board, which has the mandate to safeguard public safety and the safety of plant personnel.



### Safety issue overdone

To some extent, the issue of safety regulation in nuclear facilities has been overdone. I have often thought of this in the following way. Supposing you had a little island in the Pacific which had not come into contact with any civilisation and let us assume that they heard that such a thing as a motor car was available. What do you suggest they should do? Would you suggest they get a car and start driving it around and finding out what happens, or would you suggest they first train traffic inspectors, policemen and so forth? I think any sensible person would let them first get a car, run the car around and then they can train the traffic inspectors.

You must first have nuclear installations that you train people to run safely. Of course, you must develop the expertise in regulatory activities. The size of the programme perhaps determines the need for the formal segregation of the inspection activities, and I think now we have reached a stage where we should have a separate body.

Thirty years of nuclear power so far in its total has exposed all of mankind to the equivalent of one day's natural radiation that the world receives. Intrinsically, the safety of nuclear plants is very high.

### Nuclear Power Board's role

The challenge now is really on the management front. I think decision-makers of the country certainly believe that we need a nuclear power programme of a certain size. This is important in the near term because shortages in the power front have to be made good. It is important in the longer term because people are convinced that we cannot really expand coal-based power beyond certain limits.

So the country will, in fact, want to step up the nuclear power programme. The kind of programme we are looking at is not overambitious. It is within the potential of the country, and at least the industry is of the view that the programme we have set up is capable of being fulfilled as far as their inputs are concerned. So what we need really is a proper management framework. This is what the Nuclear Power Board will concentrate on.

The 10,000 MW programme will create a sound nuclear power base in the country. We expect that something like 3,50,000 MW of nuclear power can be made available even without thorium utilisation. This is, of course, some time in the 21st century. This is the kind of potential available based on the current type of reactors followed by fast reactors.

For this we require a healthy industry and an expertise that is not thin, but both

extensive and in-depth. So we think the 10,000 MW programme is a kind of entrance fee you have to pay to get into that kind of bazaar.

### The problem of nuclear waste

In normal operation, the waste generated is really very small. These wastes are segregated from the systems and usually the resins that treat the reactor water pick up radiation. That is taken out, mixed up with concrete, bitumen, etc., and stored in the reactor plant area.

Long-term wastes are associated with the spent fuel. When it is stored as such in the pool, it is still encapsulated but after you take it to the separation plant, you separate it into plutonium and residual uranium. The highly radioactive waste is separated and new technologies have been found out to change these highly radioactive wastes into a glass form, that is, vitrified, which is also then encapsulated and stored under surveillance. Eventually it may be necessary for us to locate one or two geological repositories — deep mine shafts where we can build vaults to store these under control — without any chance of radiation getting into water bodies.

### Manpower constraints

To some extent, it is true that because there has not been a growth in the atomic power programme, younger people have not felt so motivated to join the programme. The attraction of the early days could not be sustained for various reasons, including growth opportunities in other spheres such as the oil sector, the private sector or the business sector. But we still have a fairly large reservoir of potential talent in the country and with that talent, if trained and there is a programme on which it can be used, we can certainly man this programme ... the temporary setback in induction that we have experienced would be a thing of the past.

### Kalpakkam II

We expect that the second unit will be started some time in the second quarter of next year. There is no hold up; it is simply that we have to complete various final piping activities and the pre-commissioning checks. There is a lot of work to be done ... the heavy water will not be a problem.

### Exports of nuclear technology

I'm sure a time will come — today it may be considered a little premature because of our own pressing needs — there will be other countries, notably in South East Asia and Africa, which would be interested in the small sized reactors, whether they be 235 MW or 500 MW. Once we put our industry in order, such possibilities are bound to come about.

## NUCLEAR POWER ENGINEERS LURED BY GULF COUNTRIES

Bombay THE TIMES OF INDIA in English 9 Jul 84 p 21

[Text] Madras, July 8 (UNI)--The drain of trained engineers and technicians to the Gulf countries being witnessed in the country's petroleum industry has now gripped the nuclear power sector too, investigations show.

Many experienced engineers and supervisors at the Madras Atomic Power Project (MAPP) at Kalpakkam have left the project for the Gulf countries, MAPP officials said.

Surprisingly they take up assignments not in the nuclear power sector but in conventional power projects.

The MAPP project director, Mr K.S. N. Murthy said that 64 engineers and highly skilled supervisors had left the project till date.

In all, 41 engineers and highly skilled supervisors had left the MAPP before the plant went critical in July last. Twenty-four of them, three engineers and twenty-one technicians had left after it was commissioned, he added.

An engineer needs four years experience after a two-year formal training to operate the plant.

"Fabulous" Pay

Why should people leave atomic power plants?

Enquiries show that the take-home pay offered by prospective employers in Saudi Arabia and other Gulf countries for trained engineers is 10 to 20 times more than what they receive in India.

A graduate engineer at Kalpakkam starts with a salary of around Rs 1200.

Employees taking training in the plant are to execute a surety indemnity bond. But compensation in case of resignation is limited to the total stipend received during the training. This is easily met by those leaving the project.

MAPP officials could not say if the department of atomic energy had any plans to prevent the drain of trained manpower.

Mr Murthy said there was shortage in specific skills such as plant operation and instrumentation and control maintenance.

Asked about ways to tackle this problem, he said this was being done in two ways: 1) drafting experienced personnel and 2) recruiting fresh men and training them.

But with the existing shortages in specific skills the options to the plant appeared to be to recruit fresh hands only.

This became evident when a party of newsmen to the plant noticed recently that almost all the operational personnel at the control room at the 235 mw. first unit of MAPP were young professionals.

The first unit requires about 750 engineers and technicians for operation and maintenance.

Mr Murthy said 70 operational staff members had been mobilised for running unit two of the plant, also of 235 MW. capacity, which was stated for commissioning in the first quarter of next year.

An additional 200 engineers and technicians over and above the 755 required for the first unit are needed for the second unit.

CSG: 5150/0034

## MAJOR POLICY DECISION ON TARAPUR SAID TAKEN

Madras THE HINDU in English 18 Jul 84 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI July 17

A new strategy is now being adopted by India to reduce, if not repudiate, its reciprocal commitments under the Tarapur agreement, following the unilateral disavowal of its contractual obligations by the U.S. to supply both fuel and spare parts for the plant.

A policy decision has been taken not to raise the question of Tarapur in any context in future, either formally or informally, in the conduct of Indo-American bilateral relations, so that the U.S. does not get an opportunity to talk of residuary safeguards even after reneging on the agreement.

### The new strategy

Hitherto, the Government of India never missed an opportunity to rub in the point that the U.S. had gone back on its solemn commitments, in utter disregard of the legal position for totally untenable political reasons, to exert pressure and compel the country to submit to the highly discriminatory demand for more stringent safeguards on its entire nuclear programme. But now the strategy is to treat this unhappy chapter as closed and not to talk about it at all, if India can help it.

This new policy line represents a complete reversal of the earlier approach of insisting, even if it was only for purposes of record, that the U.S. had still the responsibility to continue to supply essential spares within the framework of the existing safeguards until the expiry of the agreement in 1993, despite the transfer of the fuel supply obligation to

France. Now India is proceeding on the assumption that the Tarapur agreement remains nullified in all its essential aspects with the U.S. having gone back on both the commitments.

### No locus standi

In other words, the U.S. has no longer any locus standi in India's view to enter into any discussions on how it should continue to comply with the safeguards during the remaining nine years of the non-operative agreement and even thereafter as a perpetual obligation. It is open to India to let the International Atomic Energy Agency (IAEA) apply the safeguards at Tarapur, as was done in the case of the Rajasthan atomic power plant after the termination of the agreement with Canada, as a matter of its own discretion and not as part of a binding commitment under the lapsed Indo-U.S. accord even after its one-sided repudiation.

### Final reminder

It is to drive home this subtle distinction, and extricate itself from the clutches of Washington, that India has decided not to talk any more of the spare parts. After handing over the whole list a few months ago to the U.S. Embassy in Delhi as a sort of a final reminder of its double violation of the 1963 agreement, the Government has not raised this again in pursuance of this new policy of allowing the infringed accord to become a dead issue in due course.

If the U.S. raises the question of residuary safeguards at any stage, India will refuse to discuss the matter as a bilateral issue, although it has no intention of going back on its trilateral

understanding with the IAEA as an international obligation. The purpose of this strategy is to get the U.S. out of the way and deny it any effective voice in determining the degree of safeguards applicable to Tarapur during the remaining nine years of the infringed agreement.

Though West Germany has agreed to supply most of the essential spare parts required by India for running the Tarapur plant, some questions have lately been raised whether the IAEA should be notified about the sensitive nature of some of these items which might attract stricter safeguards with a built-in perpetuity provision. In discussing the implications of this move with West Germany on a bilateral basis, India is taking care to see that the U.S. does not come into the picture as a matter of right by treating this arrangement also as a trilateral issue as was done in the case of France over the transfer of the fuel supply obligation.

### **West German stand**

The West German Government has so far avoided getting caught up in this controversy by agreeing through an earlier exchange of notes that the same safeguards applicable to the French-supplied fuel would apply to the spare parts provided by it. In other words, West Germany too has tried to leave the perpetuity aspects undetermined for the present as France has done, although India has been maintaining that both fuel and spares are being provided within the framework of the 1983 agreement which would automatically come to an end with its expiry.

CSO: 5100/4741

## BRIEFS

**TALCHER HEAVY WATER PLANT**--The heavy water plant at Talcher will be commissioned by next year. Replying to a question in the Lok Sabha, the minister of state for science and technology, Mr Shiv Raj Patil, assured the house that heavy water will be produced in the plant using foreign technology. He also said that capacity established in the country for producing heavy water will be able to meet the demand fully. In reply to the main question, he said certain technical deficiencies in the Talcher plant, which were identified during trials, are being rectified. The expenditure incurred so far is around 62 crore rupees. [Text] [BK251014 Delhi Domestic Service in English 0830 GMT 25 Jul 84]

**NEW ATOMIC REACTOR**--Bangalore, July 2 (PTI)--"Dhruva," a new atomic reactor to produce isotopes for industrial purposes, will be commissioned on August 15, according to Dr Raja Ramanna, chairman of the Atomic Energy Commission. The new reactor near Trombay would be more powerful than the one already there and would produce isotopes of various types, Dr Ramanna said, inaugurating the month-long seventh annual science festival organised by the Bangalore science forum here yesterday. He said the reactor had been completely designed and fabricated by Indian scientists. So far only the Trombay reactor had been producing isotopes worth Rs 2 crores annually for industrial and agricultural purposes in the country. [Text] [Calcutta THE TELEGRAPH in English 3 Jul 84 p 5]

CSO: 5150/0035

## EFFORTS TO COUNTER PROPAGANDA AGAINST PROGRAM IN U.S. NOTED

Karachi DAWN in English 2 Aug 84 p 4

[Text]

WASHINGTON, Aug 1: Pakistan has moved determinedly to dispel the misinformation spread by Senator Cranston about Islamabad's nuclear programme to justify US arms aid cut. It has distributed hundreds of copies of a lucid, concise and convincing enunciation of Islamabad's nuclear policies to Congressmen, media representatives and Administration officials, and more are on their way to university scholars, area specialists and "think thank" researchers.

The Pakistan Embassy enunciation questions the Senator's assumption that Pakistan is engaged in developing a nuclear bomb which the Muslim world will use in a holy war against Israel or India, and challenges his selective morality which picks on Pakistan but takes no cognizance of others who have already acquired the capability.

Cranston's threat to move an amendment to the US Foreign Aid Bill this summer to withhold further sales of arms, including F-16's to Pakistan has made it a live issue on the Hill and Congressman Edward Markey's "non-proliferation task force" has arranged a discussion for Thursday in the Russell Senate Office building on the subject "Nuclear Pakistan: something to stop or manage."

USA's Deputy Assistant Secretary of State Howard Schaffer has been briefing the staffers of the Senate Foreign Relations Committee, and Pakistan's Ambassador Ejaz Azim on Wednesday conferred with Assistant Secretary of State

Richard Murphy and briefed nuclear specialist Rodney Jones of Georgetown University's Centre for Strategic Studies. The Pakistan envoy is scheduled to meet Senators Paula Hawkins, Charles Mathias and Rudy Boschwitz over the next few days.

The Brochure "Setting the Record Straight" (produced by the Embassy's Information Division) pinpoints the contradictions in Senator Cranston's statements. He said in the Senate on June 21: "I have no evidence that Pakistan has actual nuclear bombs in hand, or that Pakistan has already produced a specific amount of weapons grade material."

But five days later, he told a conference on international terrorism that "Pakistan has joined the nuclear club."

The Brochure takes exception to the Cranston insinuation that Pakistan — a friend of long standing — is a terrorist State, and points out how the word "Jihad" is frequently mistranslated to create misunderstandings about Islam.

In a point-by-point rebuttal of the false assumptions on the basis of which the Californian Senator has jumped to his conclusion about Pakistan nuclear weapons capability, the Embassy statement says: "The laboratory scale plutonium reprocessing facility at PINSTECH is too small to produce enough material over a period of several decades, even for a single device."

It adds: "Pakistan has no team for designing nuclear weapons. Consequently, the question of expanding the team does not arise." It



further points out that "IAEA inspectors have carried out dozens of inspections of KANUPP. They have certified on each occasion that they came up with no evidence of any diversion of nuclear material from this or any other facility under its safeguards in Pakistan."

The Brochure says: "Pakistan has not imported any uranium from Libya. In fact, whatever uranium it has acquired for its pilot programme has been imported under IAEA safeguards — for its non-existent nuclear weapons programme, Pakistan has neither sought nor has it received assistance from China."

Explaining why a nuclear energy development programme is imperative for Pakistan's economic progress, the Embassy says: "On a per capita basis, the estimated fossil fuel resources in Pakistan amount to only three per cent of the world average."

The Pakistan Embassy statement says: "It is a matter of great regret that instead of persuading India, which exploded a nuclear device in

1974, to respond to Pakistan's proposals (about a nuclear weapons-free zone in South Asia), the tenor of Senator Cranston's speeches tends to encourage pre-emptive strikes against Pakistani installations.

"Votaries of non-proliferation should not be selective in airing their concern over the nuclear programme of one particular country only. The certification sought from the President of the United States in the case of Pakistan should be required in respect of all US aid receiving non-nuclear weapon States or at least those countries which have not signed the Non-proliferation Treaty."

The Pakistan Embassy's response to the Cranston campaign concludes: "Americans pride themselves on the moral base of their foreign policy. Equity demands that they should not play favourites in matters pertaining to nuclear proliferation, otherwise the very basis of their drive to prevent the spread of this instrument of mass destruction would be knocked out."

CSO: 5100/4743

PRESIDENT ADDRESSES MAJLIS-I-SHOORA ON NUCLEAR ENERGY

11 July Speech

Rawalpindi THE PAKISTAN TIMES in English 13 Jul 84 p 1

[Text]

The President General Mohammad Ziaul Haq, today declared that Pakistan had the capability to enrich uranium but it would never use that capability for any purpose other than the peaceful.

Addressing the 10th session of the Majlis-i-Shoora here, he said that Pakistan was compelled by the constraints of its energy requirements to exploit the nuclear technology. He said Pakistan had said number of times that it had no intention of using nuclear technology for military purposes. In spite of that people like Senator Alan Cranston of the United States, were propagandising against Pakistan's nuclear programme. He said no doubt Pakistan was endowed by Almighty Allah with a lot of talent who were ready to put their best in the service of nation and were capable of attaining exemplary result at international level. But, he said, Pakistan was against atomic proliferation and raised its voice at international levels.

The president said Pakistan was ready for any international arrangement aimed at stopping the military use of nuclear technology.

But, he said when Pakistan was asked by international agencies not to acquire atomic technology then it would only be befitting that they asked the South Africans, the Israelis, Indians and many other countries about their atomic programmes. Those countries were never asked questions on the plea that they already had the atomic devices so why stop them.

He said Pakistan had unilaterally offered India to have mutual pact to allow joint inspection of the two countries' nuclear installations but it had been two years since the Government of Pakistan heard anything from India on the subject.

He said Pakistan would never use atomic capability in the military field because it was a peace-loving country. He said that Pakistan had to exploit the atomic capability for providing additional energy for bringing about rapid industrialisation and progress in the country.

## Editorial on Zia Speech

Rawalpindi THE PAKISTAN TIMES in English 13 Jul 84 p 4

[Editorial: "Nuclear Energy"]

[Text]

One of the important points raised by President Ziaul Haq in his speech in the Majlis-i-Shoora on Tuesday concerned Pakistan's peaceful nuclear energy development program and the motivated propaganda against it in a section of the foreign media. The president once again affirmed Pakistan's peaceful intentions in the nuclear field and said that it was developing nuclear energy to meet its power needs. Pakistan faces a growing crisis in the energy sector, with demand outstripping supply by a wide margin. The situation has been worsening from year to year, as is evident from the increasing resort to load-shedding and cutback in energy supplies to industrial, agricultural and domestic consumers. Pakistan produces only 10 per cent of its oil requirement, the rest in imports at a huge cost of Rs 1,900 crore every year. Gas is a fast depleting resource. Coal reserves are small, and its contribution to the total energy pool is minuscule. While this is the resource position, demand has been going up by leaps and bounds because of expanding industrial and domestic use, of village electrification, etc. In the circumstances, Pakistan is left with no option but to seek a nuclear solution to the growing power shortage. The achievement of the capability to enrich uranium is directed towards this end.

In this context President Zia also referred to Pakistan's stance on the issue of nuclear non-proliferation and said that it has consistently taken a stand in internal forums which should leave no one in any doubt about the matter. He said that Pakistan has always supported proposals to reduce and outlaw nuclear weapons. What is more, its nuclear installations are regularly inspected by representatives of the International Atomic Energy Agency who have described them as completely safe. Pakistan has also proposed that South Asia should be declared a nuclear weapon free zone so that this area could be forever secured from the threat of a nuclear holocaust. No country with military nuclear designs would make such a proposal, yet ironically a one-sided propaganda campaign has been carried on in the world media against Pakistan and no question is asked of countries like India and Israel which are known to have acquired nuclear weapons capability, the latter even having exploded a nuclear device back in 1974. There is no pressure on them to sign the nuclear non-proliferation treaty, while Pakistan, despite its unblemished record in the field, continues to be made a victim of baseless allegations. The president was right to announce that Pakistan will not be deflected from its course by false propaganda, pressure or blackmail and will continue to strive to achieve self-sufficiency in nuclear energy. This is a policy that is fully in tune with our national interests and the aspirations of the people.

## DAWN on Nuclear Position

Karachi DAWN in English 15 Jul 84 p 7

[Editorial: "Peaceful Nuclear Pursuits"]

[Text]

[Text] President Ziaul Haq has done well to restate Pakistan's well-known position on its peaceful nuclear programme. Both in his interview to the *WALL STREET JOURNAL* and in his address to the tenth session of the Majlis-i-Shoora, he has left no one in doubt about the purpose of this programme. There is, therefore, no question of any change in the direction of its nuclear pursuits, which are well-advanced in some areas. The major aim of the programme is to find a viable answer to the fast-growing energy needs of the country, which, by the year 2000, are estimated to touch the level of 19,500 mw. The projected yield by then from the available sources, including those yet to be tapped, is not expected to exceed 9,500 mw. This huge gap cannot be filled by expensive imports. There is such a thing as the discipline of financial facts. Pakistan is too poor for such a stupendous demand. Hence the compulsion for developing the nuclear energy potential for meeting the large deficit. Energy from traditional sources is also costlier than nuclear power. According to one estimate, the average power cost from the projected 937-mw nuclear plant at Chashma will be about 50 paise per kwh as against 150 paise per kwh from an oil-fired plant of the same capacity.

In theory, however, there is the unpleasant possibility that nuclear facilities harnessed for generating electricity may be diverted to the making of atomic weapons. On this, too, Pakistan's conduct has been above board. As early as 1979 Pakistan mooted the idea of a nuclear weapon-free zone in South Asia and worked hard to get it accepted by the UN Assembly. It has also offered to sign the Nuclear Non-proliferation Treaty (NPT) provided India agrees to do the same. As President Zia has recently pointed out, it is patently unrealistic to expect Pakistan, which has no nuclear weapon capability, to sign the NPT while countries like India, Israel and South Africa (to name only a few) which have that capability as a proven fact, continue to keep out of it. If the credibility of Pakistan's consistent position on non-proliferation is of any interest, this country has accepted all the safeguards laid down by the International Atomic Energy Agency (IAEA). The IAEA has been free to inspect nuclear facilities in Pakistan. For example, the IAEA has inspected 48 times the nuclear power plant in Karachi. Even U.S. scientists have felt free to visit such plants in this country. About two years ago, Pakistan made an extraordinary offer to India — that of joint inspection of all nuclear facilities on a reciprocal basis. There has been no response from the other side to this day.

About the ingenious bogey of an "Islamic bomb", in which Pakistan and Libya have been linked by some strange logic, one can only say that this is a case of prejudice made infinitely worse by over-worked imagination. Where this particular insinuation is either made or implied in India, one cannot but point out that the boot is rather on the other leg. The *HINDUSTAN TIMES* has recently disclosed, along with all the relevant facts, that India came close to transferring its entire nuclear technology to Libya

during the Janata regime. In mid-1978, the then Indian Prime Minister, Mr. Morarji Desai, did sign an agreement with Libya involving the transfer of nuclear know-how, including plutonium reprocessing techniques, in return for two million tonnes of crude oil worth about 400 million U.S. dollars. However, later India did not carry out the agreement for domestic political reasons. The *HINDUSTAN TIMES* disclosure does show nevertheless that the inventors of the so-called "Islamic bomb" are wide of the mark. It is time the concerned quarters took Pakistan's upright stand on this issue more seriously than they have done so far and spared this country the obligation of rebutting monotonously allegations and insinuations that have been contradicted convincingly a hundred times before.

CSO: 5100/4739

SCIENTIST KHAN TO APPEAL DUTCH CONVICTION

GF030953 Karachi DAWN in English 30 Jul 84 p 2

[Text]

[Text] Lahore, July 29 — Pakistani scientist Dr. A. Qadir Khan's appeal against his conviction by a city court in Holland would be filed the day after tomorrow in the District Court of Amsterdam. Mr. Badiuzzaman, the lawyer engaged by the Federal Government to defend Dr. Khan, left here for Amsterdam on Sunday via Islamabad.

In his appeal to the Dutch court, Mr Badiuzzaman intends to submit on behalf of Dr. Khan that the decision of the lower court was against the principles of natural justice as his client was not given a chance to defend himself. He intends further to argue that the decision is against international law, under which a court may not punish a person without giving him a chance to defend himself. The charges under which the petitioner was convicted and the prosecution's allegation that the petitioner had smuggled some apparatus to Pakistan with a view to using it in the atomic plant there are baseless.

The petitioner refuted the charges and submitted that the apparatus, which was alleged to have been smuggled, was available in the open market and it was not meant for atomic processing alone as it could be used for other purpose also.

In his brief appeal, Dr. Qadir Khan will contend that he was involved in this case with mala fide intent and prayed the court to declare his conviction by the lower court as illegal and without lawful authority.

According to the Dutch legal procedure, lower courts deliver summary judgments but when an accused intimates to the court that he intends to file an appeal against its order, the court pronounces a detailed judgment.

After Dr. Khan's intimation to the lower court that he intended to contest its verdict, the court sent a detailed version of its order to a local lawyer engaged by the Pakistan Government the day before yesterday. Mr. Badiuzzaman has now left for Holland to file an appeal against the verdict.

## CRITICISM OF NUCLEAR PLANS REBUTTED

GF071801 Karachi DAWN in English 5 Aug 84 p 7

[Editorial: "Senator Cranston's Carping"]

[Text] The debate in the U.S. Congress on American military aid to Islamabad and Pakistan's nuclear programme which has been sparked off by Senator Cranston is not only ill-timed but can also be self-defeating. The Democratic senator from California has let it be known that he plans to introduce an amendment to the U.S. foreign aid bill which would require the Reagan administration to suspend the supply of F-16's to Pakistan until Islamabad dispels U.S. concern about its nuclear programme. It so happens that this concern is not new. For over eight years voices have been raised in Washington alleging that Pakistan is on its way to becoming a nuclear weapon state. So powerful have these lobbies been that the Carter administration cut off aid to Pakistan twice, first in 1977 on the plea that it was in the process of acquiring a reprocessing plant and then in 1979 when it was said to be going in for uranium enrichment. Although the Reagan administration's approach has been more pragmatic and logical, it would be wrong to assume that the critics of Pakistan's nuclear programme have been silenced. The latest to raise the issue is Senator Cranston who has alleged that Islamabad now has "the designs, the hardware, the plants and the personnel capable of producing several nuclear weapons per year." In the smear campaign launched against Pakistan, its close ally, China, has not been spared either. Islamabad is being accused of acquiring the technology for its nuclear bomb from Beijing, which has now become the target of the so-called nonproliferation lobby in Washington. As a result, the Sino-American nuclear cooperation agreement concluded in April has not been ratified so far by the U.S. Congress.

The charges made against Pakistan simply bear no scrutiny. Islamabad has repeatedly assured the American Government that its nuclear programme is designed to meet its peaceful need for energy and has no military purpose. That the Reagan administration gives credence to Pakistan's assurances is underlined by its move to restore aid to this country in 1981 when the 3.2 billion-dollar economic assistance and military sales package was concluded. In December 1981, the Congress adopted an

amendment to the foreign assistance bill specifically exempting Pakistan from the application of the Symington amendment until 1987. This amendment bars aid to any country delivering or receiving nuclear enrichment equipment or technology. It need hardly be pointed out that the acquisition of nuclear technology by a country does not mean that it possesses a nuclear bomb. Instead of applying this sweeping piece of legislation to Pakistan, the American Congress provided for a waiver in this case, but stipulated an interruption of all aid in case Islamabad detonated a nuclear explosive device. It is obvious that the United States Government has not been required to adopt this extreme measure because Pakistan has not exploded any nuclear device. Hence, the new-found concern in certain sections of opinion in Washington is difficult to explain. For instance, last April Senator Cranston sought to tighten controls by getting a thinly attended meeting of the Senate Foreign Relations Committee to adopt a bill requiring the American President to certify that Pakistan is not "developing a nuclear explosive device" or acquiring technology for "manufacturing or detonating a nuclear explosive device." This amendment was later modified.

The move in the U.S. to make Pakistan abandon its nuclear programme on the plea of nonproliferation speaks of the adoption of dual standards. While Pakistan has been singled out for attack, other countries which have been described as being on the nuclear threshold, namely, Israel and South Africa, have been allowed to pursue their nuclear designs unhindered and no move has been made to interrupt economic aid to, and ties with, them. In fact, they have the best of relations with the United States. Some observers see this revival of the nonproliferation debate in Washington in the context of the U.S. presidential election campaign. Whatever be the underlying motives, it is clear that resuscitating issues which were taken to have been laid at rest — at least until 1987 — will only stir up a controversy which cannot be expected to create a congenial climate for the maintenance and further development of friendly U.S.-Pakistan relations.



## HEAVY WATER DEAL WITH SWISS DENIED

East London DAILY DISPATCH in English 27 Jul 84 p 14

[Text]

JOHANNESBURG — The chairman of the Atomic Energy Board, Dr J. W. L. de Villiers, has dismissed a report published in the United States that a Swiss company may be about to sell South Africa a heavy water production plant.

According to the latest issue of Nucleonics Week, an industry newsletter, the Swiss Foreign Affairs Department has already mounted an inquiry, following a United States request that the report should be investigated.

Dr De Villiers said here that South Africa was not interested in heavy water production. The reports were "pure speculation".

Unlike South Africa's light water reactors at Koeberg, heavy water reactors run off natural rather than enriched uranium.

Heavy water can also be a critical component in weapons production.

The Swiss firm the American report says is involved is Sulzer Brothers, an engineering concern that sold Argentina a similar plant in 1980.

Nucleonics Week quoted U.S. State Department sources who

said they could see "no peaceful use" for the plant and would therefore "make every effort to stop" the purported sale.

The Reagan Administration has already held up a Swiss request to receive 200 kg of U.S.-origin plutonium from France, pending the outcome of the investigation into the alleged South Africa deal.

The newsletter quotes "other U.S. sources" who speculate that South Africa may be finding its own uranium enrichment process too costly and is thus looking for alternatives.

The United States opposes the transfer of sensitive nuclear technology to any nation that does not accept international Atomic Energy Agency safeguards at all its facilities. Pretoria has refused to permit any inspection of its Valindaba enrichment plant.

South African officials say of the U.S. report that this country is fully committed to the light water system, and would therefore have no use for Sulzer-type equipment.

"The technologies are totally different, and it would mean going in a

totally different direction."

State Department sources quoted by Nucleonics Week said this was precisely what was bothering them.

An Administration official familiar with South Africa's nuclear programme has claimed that Pretoria first showed an interest in a heavy water plant two years ago.

A nuclear expert at the Congressional Research Service, Mr Warren Donnelly, speculated that if Valindaba was proving uneconomic and supplies of enriched uranium were not available from other sources, South Africa might be tempted to adopt the heavy water approach.—DDC.

MINISTER: FINLAND SHOULD PUT ITS SPENT FUEL IN ROCKS

Helsinki HELSINGIN SANOMAT in Finnish 28 Apr 84 p 10

[Article: "Lindblom: Finland Must Prepare to Store Nuclear Waste"]

[Text] According to Seppo Lindblom (Social Democrat), Minister of Trade and Industry, Finland will have to make preparations to store its highly radioactive nuclear wastes inside its own bedrock.

Even though the goal is to place reprocessing waste and spent fuel abroad, beginning in the year 2020 final placement of the waste in Finland may come to the fore. Lindblom was responding on Tuesday to a written parliamentary inquiry from 14 members of Parliament about test drillings by Teollisuuden Voima [Industrial Power Company] and the authority of municipalities in relation to them.

TVO started test drillings at the beginning of winter at Katossuo in the municipality of Lavia. The problem of final placement of nuclear wastes affects only TVO at this time, because waste from the nuclear power plants of Imatran Voima at Loviisa are being taken to the Soviet Union.

According to Lindblom, plans for long-term intermediate storage of nuclear wastes are to be ready by the end of this year. By the end of the year 2000 a final location should be clear.

According to Lindblom, a final location is required to have no more deposits or other natural resources that would give reason for drilling. According to the minister, the final location does not require any protective zone or other safety arrangements.

9611

CS0: 5100/2563

FINLAND

SCIENTISTS DEVELOP NEW METHOD FOR PROCESSING REACTOR WASTE

Helsinki HELSINGIN SANOMAT in Finnish 11 May 84 p 13

[Article: "IVO [Imatra Power Company] Studies Concentration of Nuclear Wastes"]

[Text] Loviisa -- A new method of processing radioactive materials has been developed in Loviisa. As a result of development work by IVO and the University of Helsinki, evaporation wastes can be precipitated into a paste-like substance. Then the amount of wastes left is only one-thirtieth that of the former solution.

The research of IVO and the University of Helsinki has concentrated on the most important element in the waste, cesium. Now it can be separated from evaporation waste, and the clean part can be released into the sea.

The procedure is suitable for processing substances with so-called "medium" activity, such as waste waters. So far, these have been collected into 300-cubic-meter containers. By the end of last year a hundred truckloads of waste had been accumulated.

According to the provisions of the Loviisa nuclear plant's license, these compounds could be released into the sea all at once. IVO has collected the wastes into containers, however, because in storage they have time to change into salt solutions. In one 300-cubic-meter container there is only one milligram of actual cobalt and 30 milligrams of cesium.

Concentration of nuclear wastes is rather expensive. But Imatra Power has calculated that it is worthwhile to implement the procedure.

According to the plan a separate stabilization facility costing 25 million will be built in connection with the Loviisa plant, and postponing the construction work is a more advantageous alternative than concentration.

9611  
CSO: 5100/2563

## NUCLEAR POWER PLANT OPERATIONS

Paris AFP SCIENCES in French 7 Jun 84 p 45

[Text] The availability of France's nuclear plants was very good during April, at 82 percent. According to EDF [Electricite de France], unavailability associated with scheduled stoppages for inspection and recharging was 10.8 percent during the same month. During the first four months of 1984, the availability of these plants was nearly 87 percent, and the unavailability associated with scheduled stoppages for inspection and recharging was 6 percent. For all the nuclear equipment operated by EDF, availability for these first four months was 86.5 percent.

The major events for various plants have been:

Bugey 3: Stopped since 9 March for partial inspection and recharging.

Bugey 5: Stopped from 14 to 21 April for various work.

Fessenheim 2: Stopped since 21 April for partial inspection and recharging.

Blayais 1: Stopped since 27 April for partial inspection and recharging.

Dampierre 1 (+): Restarted on 12 April following partial inspection and recharging (since 2 February).

Dampierre 4: Stopped since 28 April for partial inspection and recharging.

Gravelines B4: Stopped since 25 April for partial inspection and recharging.

Tricastin 1: Stopped since 7 April for partial inspection and recharging.

St-Laurent B1: Stopped since 20 April for partial inspection and recharging.

Marcoule G3: Stopped since 13 April for repairs (cladding rupture followed by carbon dioxide leak).

(+): During the last stoppage of this plant, inspection of the steam generators disclosed corrosion of some tubes which showed defects in their joints to the bearing plate.

These joint defects were observed on other 900 MW REP plants, and laboratory tests have recently made it possible to establish a correlation between this type of defect and corrosion phenomena. Since the latter can ultimately lead to sealing problems, it was decided to preventively plug all the affected tubes in all similar plants. The duration of maintenance and repairs performed during scheduled stoppages should not be increased by this anomaly (less than about ten out of 3400 steam generating tubes).

11.023

CSO: 5100/2579

## NUCLEAR WASTE STORAGE PROJECT ABANDONED

Paris AFP SCIENCES in French 7 Jun 84 pp 48-49

[Unsigned article]

[Text] The inhabitants of St. Priest-la-Prugne, the small Loire commune which has been fighting for four years against the installation of a storage center for radioactive waste in its midst, has made its slogan, "Goodbye Garbage," come true. The government has indeed officially announced that it was dropping the project.

"This time it's for sure, it's over," declares the satisfied mayor of St. Priest, Jean Rathier, who is finally rid of "a great worry." The letter which Jean Auroux, secretary of state for energy, wrote him on 3 May, is unambiguous: "It is my pleasure," wrote the minister, "to confirm that any project for storing radioactive waste on your commune's territory is abandoned. I am certain that this decision was awaited by many people in your commune, and that it is consistent with your wishes."

Ever since the project was announced in 1979, the commune bristled at the thought of having on its territory the second center for storing waste from nuclear plants. The only center, in Hague (Manche), should very soon be full, and those responsible for energy policy are urgently looking for other possible storage sites.

The idea of transforming the former uranium mine at Bois-Noirs, located about 2 km from St. Priest village, seemed appealing. No need for impact studies nor public domain inquiry, since the land was owned by Cogema, a full subsidiary of the AEC. It was also believed at the time, that the inhabitants, with a long custom of coexistence with uranium and radioactivity problems, would not show any opposition.

That was a mistake. An association, the Bois-Noirs Collective, formed against "atomic dumping," immediately found support from the socialists and from the Socialist Party mayor of Roanne, Jean Auroux.

When the left came to power hope was rekindled in St. Priest. Between two presidential campaign visits, Francois Mitterand had promised the elimination of a project "unanimously condemned by elected representatives and the people." In 1982, Alain Herve, minister of energy, confirmed that this "inacceptable" 1979 project was abandoned, without officially confirming anything to the inhabitants. St. Priest became concerned again one year later, when Mr Auroux, the new man in charge of energy, announced without any further details that storage sites were being prospected. Since then, rumors and suspicions about the possibility of a new project in St. Priest mobilized the population once more.

During a decisive meeting in Roanne on 25 May, in the presence of Mr Auroux, Cogema acceded to the government's request to yield, for a symbolic one franc, the mine's four hectares of land and its 5000 square meters of buildings, which according to Cogema represent a value of 5 million francs. Moreover, the company promised to provide 2-3 million francs for the commune's economic development.

They are now breathing more easily in St. Priest-la-Prugne. Cogema's former plant will become a factory for granulated fuel made from wood waste. The mine's decanting pool will be transformed into a waterway, and the small river, la Bresbe, which flows through the community, will become the object of a "clean river" contract. On 10 June, St. Priest will have a festival, and the Bois-Noirs collective, which is organizing it, will celebrate "the victory of a fight which now belongs to the past."

11,023

CSO: 5100/2579

AUROUTX REPORT ON NEW RADIOACTIVE WASTE STORAGE SITES

Paris AFP SCIENCES in French 21 Jun 84 pp 42-49

[Speech by J. Auroux, former secretary of state to the minister of industry, in charge of energy, at the Higher Council for Nuclear Safety; date and place not specified]

[Text] Paris—The two new surface storage sites for radioactive waste that should be planned in France for the early 1990's (see announcement in the chapter on Scientific Policy, page 1) will be realized according to the very strict criteria defined in the Fundamental Safety Rule (FSR) which Mr Jean Auroux made public on the very day of his speech at the Higher Council for Nuclear Safety.

In particular, very low thresholds are planned as far as the activity of alpha emitters is concerned, both for shipments received at the center and for the general activity prevailing there. This will therefore force the CEA [Atomic Energy Commission] to continue its studies on how to process and package waste containing these emitters.

The guidelines also provide that "it should be possible to return the land used for these sites to normal use after three centuries."

We are giving below the full text of Mr Auroux's speech.

The development of the French nuclear program makes it necessary to create two new surface storage centers in addition to the center on the Channel which, for the past 15 years, has been receiving all low and medium activity nuclear waste produced in France, as well as an underground laboratory designed to determine the conditions of permanent underground storage.

This is the gist of the recommendation made by your Council on 19 April 1983 when, based on the report of the scientific commission chaired by Professor Castaing, you advised the government, among other things, to take measures to



open two surface storage centers and to continue and expand research programs on deep-strata geology, and especially exploratory drilling in potentially suitable geologic formations.

In this respect, I would like to stress the deeply innovating aspect of the approach adopted: to obtain the opinion of an independent group on the subject of radioactive waste, so as to have outsiders cast some light on decisions amounting to long-term commitments. I would also like to express my warmest thanks to Professor Castaing and all the members of his commission for the quality and seriousness of the work accomplished.

On several occasions, the constitution of a commission was denounced by many commentators as the surest way to do nothing; we are therefore justified in asking today what happened of the recommendations issued then.

This is why, after taking enough time for reflection, evaluation and decision, I wanted to address you today to take stock of the progress already accomplished, and more precisely to let you know how we shall now go about the tasks that will lead to the selection of waste-storage sites by the operators and with the agreement of the local population, these sites being chosen in agreement with all the parties involved.

My statement will therefore include five points which will show you that considerable background work has been accomplished since the Castaing report and my communication to the IAEA [International Atomic Energy Agency] in Vienna.

1. Work leading to a new Fundamental Safety Rule;
2. Criteria for site selection;
3. Our radioactive waste management program;
4. Structures which we acquired to carry out this program;
5. Finally, I shall describe how work will proceed in the field.

First, I would like to point out that industrialized countries using nuclear energy, some of which are our European neighbors, must face the same problem, and recently announced decisions made on this question:

- the British just selected two sites, one in surface and one underground, for which the NIREX [expansion unknown] organization will make the necessary qualification studies;

- Sweden has undertaken the construction of a storage center for short-lived waste produced by reactors in operation. In that country, exploratory drillings were also made at eight different sites to acquire data on the deep-strata geology of the formations that could house an underground laboratory;



- the Federal Republic of Germany has selected the old Konrad mine to store low and medium activity waste, and the Gorleben site for underground storage. It has undertaken the construction of a research laboratory in the Asse salt mine;

- finally, Switzerland recently made public the names of three sites that will receive waste management centers.

As for us, our radioactive-waste management objectives are well defined; essentially, they are as follows:

- on the one hand, and above all, to protect workers and the public from radioactive substances and the ionizing radiation they emit, until the potential nuisances they represent have disappeared;

- on the other hand, to restrict to a minimum the interim storage of waste whenever satisfactory solutions to processing, packing and long-term storage problems already exist.

These objectives are the subject of fundamental safety rules established by safety authorities; they indicate what measures must be taken to conform to French regulatory practices.

In this respect, I would like to stress an important decision: following the work of your Council, the Fundamental Safety Rule concerning surface storage centers for radioactive waste was entirely revised and considerably improved, so that we are now the world leaders in this respect.

Indeed, this rule contains a number of guidelines on which future operators will be able to rely not only to select suitable sites, but also to design surface centers and for operating guidelines.

Among other things, it contains very strict criteria concerning acceptance of parcels at surface centers. The alpha-emitter radioactive element activity of a parcel received at a surface center shall, as a rule, never exceed 0.1 curie per ton, and under no circumstances shall it exceed 0.5 curie per ton; finally, the average activity of parcels accepted shall be below 0.01 curie per ton.

Taking this limitation into account, a person who would have to stay on the site starting today would be exposed to an irradiation from alpha emitters that would be only 10 percent higher than the average natural radioactivity in our country.

This rule was the subject of thorough discussions within the standing committee in charge of basic nuclear facilities other than reactors, with the participation, among others, of representatives of the Ministries of Health and the Secretariat of State to Environment, and experts from the CEA, the BRGM [Bureau of Geological and Mining Exploration], the Paris School of Mines, etc.

Thus, all the parties involved reached a consensus on the rules to adopt. This consensus shows that our approach was right and that we can still rely on the sense of responsibility in our country.

France and the United States are now the only two countries to have regulations of a general character established by the administration and setting a maximum content.

However, the U.S. text does not set a maximum permissible average content and therefore we can say that our rule is the most stringent and the most complete now in force worldwide; according to experts, it is thus the rule providing the greatest protection that can be reasonably established. But as La Fontaine—like your servant a great friend of nature—once said:

"It is well to make assurance doubly sure;  
Excess in this respect was never found useless."

The rule specifies our doctrine with respect to surface storage, and I think it may be useful to recall it here. It can be expressed in three points:

- during the operation and monitoring stage, no radioactivity should be disseminated; most of the radioactivity will decrease during this stage;
- it should be possible to return the land to normal use after three centuries; the residual background radiation will then be low enough to restore the land to any use; this is how the alpha-activity limitations which I mentioned previously are established, and they are the most stringent of all those that are now in force;
- finally, site selection must comply with well-defined criteria.

These criteria will lead to a strict scientific selection of storage sites. They involve in particular:

- land stability: zones with strong slopes or where landslides might occur and zones exhibiting some seismic activity shall be carefully avoided;
- hydrogeologic properties: we shall look for zones that can easily be modelled so as to obtain certainties as to the final destination of percolation water, and zones presenting also outlets with good dilution capacities, and finally zones with zero flooding risks;
- finally, the geochemical properties of soils, and in particular their retention capacities, shall be carefully examined.

Compliance with these provisions will enable us to guarantee that the radiologic impact of a waste-storage center at any given time will remain extremely low, lower than the fluctuations of natural radioactivity, and that it will not entail any risk for the workers or for the neighboring populations, or for the environment. A center thus created and operated will present fewer radiologic risks for the population than many regions of France that have a granitic underground.

We shall also be guided in our action by the principle of candor, the natural consequence of being responsible; therefore, I have decided that this rule should be made accessible to the public. I am pleased to announce today that it will be published.

Your Council also heard remarks from the commission chaired by Professor Castaing, concerning the general radioactive-waste management program established by the CEA; numerous recommendations were formulated, and taken into consideration by the CEA; thus, special emphasis was placed on research concerning processing methods designed to increase recovery of long-lived alpha emitters, and contacts were made with the CNRS [National Center for Scientific Research] to increase the involvement of the scientific community in the theoretical work that is still required to model the very long-term trends in the storage of long-lived radioactive waste.

I shall take the risk of making this meeting look like a school prize-day by announcing that this program, revised in the light of recommendations made by the working group, will also be published.

In addition, I would like to bring again to your attention two important measures that show what priority the government is giving to waste management. The first has to do with the CEA budget for this item. From 1982 to 1984, its civilian research budget for research and development designed to improve our knowledge of radioactive waste nearly doubled. The second has to do with structures: in this respect, I would like to express again my concern not to let any confusion arise between the parts played by the several actors involved:

- the CEA is in charge of research and development for processing, packing and storage methods;
- the Central Service of Nuclear Facilities Safety of the Ministry of Industry and Research is in charge of preparing regulations and making sure they are applied;
- the ANDRA [National Agency for the Management of Radioactive Waste] is a public service operating within the CEA; it is in charge of managing waste on behalf of the State and in the necessary context of its perennality;
- producers are responsible for the waste produced until it is taken over by the ANDRA, and they are expected to make a contribution in the form of a just remuneration.

Personally, as far as public opinion is concerned, I am extremely attached to this institutional clarification which, however, is not incompatible with purely scientific, less hierarchical and broader structures.

To that effect, changes were made in the internal organization of the CEA; the functions of waste producer and waste research within the CEA will therefore be provided by two entirely distinct structures. Second, the status of the scientific commission in charge of examining and assessing programs was modified to make waste producers and scientists more aware of their responsibilities.

I shall now consider the most important recommendation of your council: the recommendation to start as soon as possible the operations that will lead to the opening of two new surface storage centers on the one hand and, on the other hand, of an underground laboratory designed to study the conditions of underground storage.

A number of regions whose geological potential is suitable a priori exist and were inventoried with the assistance of the BRGM. Within these regions, we must carry out the preselection, then the selection of sites, making a clear distinction between what is involved in the case of future surface storage centers for short-lived waste and in the case of the underground laboratory designed to study the conditions of underground storage.

I shall be more specific about what is going to happen from now on, first for surface sites: the ANDRA is already in charge of making a preselection based on the criteria I just mentioned, i.e. it will pick at least half a dozen sites in suitable regions, and confirmation work will be carried out; to this effect, contacts will be established with the local communities involved; indeed, we shall have to set up a dialogue at all stages of these projects. The ANDRA, which will be the operator for all exploratory work, will also make sure that the public is informed and will be available to answer all questions that could be raised locally by the exploratory work. This will ensure that the public is well informed from the start of these projects. Nobody will have to face a fait accompli.

The confirmation work will be carried out by small teams (about 10 people) and will last about 1 year; on this occasion, drillings made at small depths and with lightweight equipment will be made to collect data on the geology and hydrogeology of the sites.

If the site is accepted after this confirmation stage, it will then undergo the procedure applicable to nuclear facilities, which will require an extensive knowledge of the environment (geology, hydrogeology, geochemistry, climatology, etc.) in order to prepare the preliminary safety report; additional qualification work will be required and will last about 2 years, during which some 15 people will have to work on the site--at the same time, the ANDRA will buy the land. We shall then proceed with the construction and operation of the center.

The work involved in preparing the site and building the infrastructures will last about 3 years and will represent approximately 120 jobs in various local firms. After this stage, the center will be operated and will generate approximately 70 jobs in local firms and 70 jobs at the ANDRA.

The research programs concerning deep-strata geology will involve more extensive exploratory work, and especially deep-hole drilling. Therefore, confirmation stages will be longer: selecting a site will take at least 3 years; in addition, since this is for a laboratory, the introduction of radioactive waste will not be considered at first; therefore, the laboratory will not follow the procedure of authorization applicable to basic nuclear facilities.

There will be a single operator for all future operations: the National Agency for the Management of Radioactive Waste. It will carry out the initial exploration work in the field; it will then develop and operate the waste storage centers and be in charge of building the underground laboratory.

For all the exploration, preselection, qualification and, as the case may be, confirmation work, the ANDRA shall establish the necessary contacts and make the studies required to ensure that proposals are submitted to the authorities within 1 year for the selection of two surface sites, and within 3 years for the selection of the underground site. So much for the timetable that, as an extension of your work, properly reconciles the requirements of our industry and those of our environment.

As for relations with local communities, I expect them to be exemplary and characterized by a responsible attitude on both sides; in other words, beyond the safety considerations that are now reflected in our regulations, they should be based on information, consultation and cooperation.

Information and candor shall be the rule in the field and at all levels. I shall therefore reject any accusations based on assumptions rather than facts, and any biased views as, under these conditions, they could not have any serious basis.

After that, both parties will be associated in consultations already during the first stage of exploration, so that a climate of confidence will create the best possible conditions for both parties to arrive at an agreement should the site explored be finally selected.

Finally, cooperation with the local communities involved will develop on the sites selected. This cooperation will certainly acquire an ecological dimension involving follow up and permanent monitoring in this respect, but also--and this deserves being stressed--a veritable economic dimension.

Indeed, it did not seem fair that the sites of nuclear power production could bring considerable indirect economic--especially fiscal--benefits to the communities where they are installed, and that the sites where nuclear products are stored and ~~decontaminated~~--although they are designed to be reversible, based on our current research and studies--should not generate significant resources for their own communities. Without going into details here, I would like to give you just a few orders of magnitude that give an idea of the industrial and economic implications of a surface storage center.

- As far as the initial investment and the various infrastructures required are concerned, we can advance figures of FF 200 million and 120 jobs over a 3-year period.

- As far as permanent activity is concerned, we can advance figures of FF 55 million per year with a personnel of 70 people or so in local firms and another 70 working for the ANDRA.

- To take into account the impact that the creation of this industrial operation will have in a community (community facilities, housing) we are contemplating--not a large-site procedure that would not be really warranted--but a significant dotation of some FF 30 million that would be allocated to the local community for its development. To this, we should add--in the spirit of equity in the treatment of nuclear sites which I just mentioned--a specific resource, in addition to traditional tax revenues, that would make financial means available to the community to the tune of FF 1 to 1.5 million per year.

Finally, to abide by the rules of decentralization and answer applications that might be the result of community decisions, I am asking the ANDRA to examine the possible candidacy of local communities, exerting of course the same scientific rigor as in the case of the sites it would have identified on its own.

In both cases, the sites will have to meet the criteria I have just defined. In other words, we might have to turn down sites that could be offered to us by local communities.

9294

CSO: 5100/2581



## FRAMATOME SEEKS DIVERSIFICATION

Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 11

[Unsigned article]

[Text] The year 1983, characterized by a retrenching French nuclear program, and by limited prospects for exportation, was a turning point for Framatome, which is considering a diversification. In its annual report, the company--held 50/50 by Creusot-Loire and the AEC--explains that "the massive national program is reaching its end" and "the expected cruising period with one or two installations per year will lead to a reduced workload." "Exportation prospects," it adds, "will be limited in the years to come, and will not compensate for the reduction in French programs."

"While maintaining the development programs indispensable for its nuclear construction capabilities, and continuing its pursuit of exportation orders," Framatome has "started studies aimed at finding profitable complementary activities, either by increasing its nuclear maintenance and services, or by seeking future activities in other fields."

At the end of 1983, 59 Framatome PWR (pressurized water) units were in service or under construction in France and throughout the world. With the connection of four new 900 MW generators into the network in 1983 (Cruas 1, Le Blayais 3 and 4, and Chinon B2), 28 generators are now operating in France and 24 are under construction (seven of them at 900 MW and 17 at 1300 MW). In Belgium, Tihange 2 was placed in service in April 1983. In South Africa, 1983 was essentially devoted to repair theing damages caused by the previous year's attacks, and to a resumption of tests. In South Korea, "construction is advancing under particularly difficult conditions." Bids were supplied to Finland, Turkey, and Egypt.

Still abroad, the maintenance division completed a deal to export PWR steam generators supplied by other manufacturers. In general, the development of maintenance and service activities was one of Framatome's priorities in 1983. Deliveries from the Chalon and Creusot plants "have remained high": 29 heavy components were supplied seven reactor vessels, six pressurizers, 13 complete steam generators, and three lower portions of steam generators for South Korea).

The personnel was "stabilized" in 1983, and on 31 December the company had 5419 employees. Revenue grew last year by 12.64 percent, from 3,929.9 million francs in 1982 to 4,426.8 million francs (of which 787.6 million in maintenance and services). Net profit (after taxes) dropped, from 276.4 million francs in 1982 to 201 million last year. Research and development costs amounted to 374 million francs.

11,023

CSO: 5100/2579



## BRIEFS

**MARCOULE REACTOR SHUT DOWN** --The management of the Marcoule (Gard) Atomic Center announced that the G3 reactor of the graphite-gas plant is definitely shut down. This reactor, which made nuclear history 25 years ago, had been stopped in April following detection of a carbon dioxide gas leak in the hot gas tubing. During this inspection, technicians had also noted several cracks, as well as significant changes in the metal's mechanical characteristics at these cracks. "These irreversible modifications," the management points out, "have led to the joint decision by the AEC and Cogema." Twin sister of the G2, the G3 reactor had a career of 25 years, although its operation was not supposed to exceed 10 years. It went critical on 8 June 1959, and its power increase ended on 4 April 1960, when its 250,000 kW were plugged into the network. According to the management, "this reactor had an exemplary performance, and as such, holds the world record for steadiness of operation among nuclear reactors." [Text] [Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 12] 11,023

**INCREASE IN NUCLEAR POWER**--On 5 June, Electricite de France (EDF) indicated that nuclear plants have provided 62 percent of France's electric power production during the first four months of 1984, thanks to a 48 percent increase over the corresponding period in 1983. This was made to a 48 percent increase over the corresponding period in 1983. This was made possible by the start of new reactors and by the excellent performance of the plants. During the first four months of 1984, the availability ratio of the plants--ratio of available power to maximum power--reached nearly 87 percent compared to 72 percent during the previous 12 months. These excellent results for nuclear power have allowed EDF to reduce the more costly production of conventional thermal plants (oil and coal) by 13 percent. Coal consumption in April thus dropped to 1.07 million tons compared to 1.26 million in April 1983, while oil usage was three times lower (93,000 tons against 271,000). Overall EDF production grew by 16 percent during the first four months of 1984, with 103.4 billion KWh, of which 63.7 billion came from nuclear plants, 20.6 billion from hydroelectric plants, and 19.1 billion from conventional thermal sources. EDF was able to fully meet consumer demand, which grew by 7.3 percent during this period, and achieve in its foreign exchanges a surplus twice as large as last year's--8.7 billion KWh against 3.8 billion. [Text] [Paris AFP SCIENCES in French 7 Jun 84 p 44] 11,023

PALUEL PWR REACTOR--The management of the Paluel (Seine-Maritime) nuclear plant announced that the first phase of the plant supplied its first kilowatts to the electrical network on 22 June at 0039 hours. This connection to the network was performed in three stages: manual at first, followed by automatic systems, with a stoppage each time to perform controller tests. The Paluel plant is the first REP (pressurized water reactor) unit in France whose nominal power is 1300 MW for each of the three production sectors planned. The uranium charging of sector 2 is finished, and the first precritical cold tests are now being performed. [Text] [Paris SEMAINE DE L'ENERGIE in French 27 Jun 84 p 11] 11,023

CSO: 5100/2579

END

**END OF**

**FICHE**

**DATE FILMED**

12 Sep + 84